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NATIONAL DAM SAFETY PROGRAM. LAKE AMES DAM (NJ00337), PASSAIC R--ETC(U)
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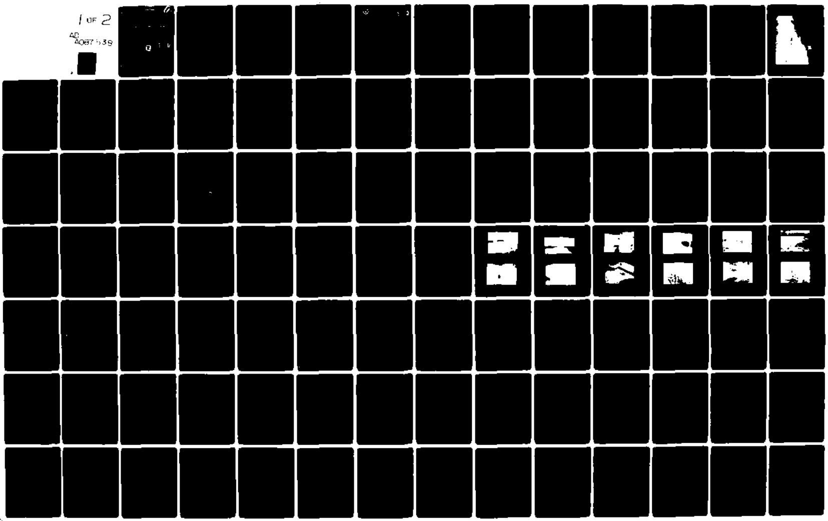

LEVEL II

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PASSAIC RIVER BASIN
HIBERNIA BROOK, MORRIS COUNTY
NEW JERSEY

LAKE AMES DAM
NJ 00337

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

DEPARTMENT OF THE ARMY

Philadelphia District
Corps of Engineers
Philadelphia, Pennsylvania

FEBRUARY 1980

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Lake Ames Dam, New Jersey
Seepage
Erosion

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report cites results of a technical investigation as to the dam's adequacy. The inspection and evaluation of the dam is as prescribed by the National Dam Inspection Act, Public Law 92-367. The technical investigation includes visual inspection, review of available design and construction records, and preliminary structural and hydraulic and hydrologic calculations, as applicable. An assessment of the dam's general condition is included in the report.

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DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
CUSTOM HOUSE—2 D & CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA 19106

IN REPLY REFER TO
NAPEN-N

28 JUL 1980

Honorable Brendan T. Byrne
Governor of New Jersey
Trenton, New Jersey 08621

Dear Governor Byrne:

Inclosed is the Phase I Inspection Report for Lake Ames Dam in Morris County, New Jersey which has been prepared under authorization of the Dam Inspection Act, Public Law 92-367. A brief assessment of the dam's condition is given in the front of the report.

Based on visual inspection, available records, calculations and past operational performance, Lake Ames Dam, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's two spillways are considered inadequate because a flow equivalent to 19 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways' adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial action to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

(2) Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment.

(3) Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

(4) Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

(5) Design and oversee the removal and replacement of the stoplog facility.

(6) Design and oversee the rebuilding of the spillway cap and abutments.

c. Within six months from the date of approval of this report, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions.

d. Within thirty days from the date of approval of this report, the following remedial actions should be initiated:

(1) Monitor the seepage at the downstream toe of the dam.

(2) Control trespassing on the dam to help decrease erosion.

(3) Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

e. Within one year from the date of approval of this report the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

A copy of the report is being furnished to Mr. Dirk C. Hofman, New Jersey Department of Environmental Protection, the designated State Office contact for this program. Within five days of the date of this letter, a copy will also be sent to Congressman Courter of the Thirteenth District. Under the provision of the Freedom of Information Act, the inspection report will be subject to release by this office, upon request, five days after the date of this letter.

NAPEN-N
Honorable Brendan T. Byrne

Additional copies of this report may be obtained from the National Technical Information Services (NTIS), Springfield, Virginia 22161 at a reasonable cost. Please allow four to six weeks from the date of this letter for NTIS to have copies of the report available.

An important aspect of the Dam Inspection Program will be the implementation of the recommendations made as a result of the inspection. We accordingly request that we be advised of proposed actions taken by the State to implement our recommendations.

Sincerely,

1 Incl
As stated

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

Copies furnished:
Mr. Dirk C. Hofman, P.E., Deputy Director
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

Mr. John O'Dowd, Acting Chief
Bureau of Flood Plain Regulation
Division of Water Resources
N.J. Dept. of Environmental Protection
P.O. Box CN029
Trenton, NJ 08625

LAKE AMES DAM (NJ00337)

CORPS OF ENGINEERS ASSESSMENT OF GENERAL CONDITIONS

This dam was inspected on 6 November 1979, by Anderson-Nichols & Co., Inc. under contract to the State of New Jersey. The State, under agreement with the U.S. Army Engineer District, Philadelphia, had this inspection performed in accordance with the National Dam Inspection Act, Public Law 92-367.

Lake Ames Dam, initially listed as a high hazard potential structure but reduced to a significant hazard potential structure as a result of this inspection, is judged to be in poor overall condition. The dam's two spillways are considered inadequate because a flow equivalent to 19 percent of the Spillway Design Flood - SDF - would cause the dam to be overtopped. (The SDF, in this instance, is one half of the Probable Maximum Flood.) To ensure adequacy of the structure, the following actions, as a minimum, are recommended:

a. The spillways' adequacy should be determined by a qualified professional consultant engaged by the owner using more sophisticated methods, procedures, and studies within six months from the date of approval of this report. Within three months of the consultant's findings, remedial action to ensure spillway adequacy should be initiated.

b. Within six months from the date of approval of this report, engineering studies and analyses should be performed to:

(1) Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

(2) Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment.

(3) Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

(4) Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

(5) Design and oversee the removal and replacement of the stoplog facility.

(6) Design and oversee the rebuilding of the spillway cap and abutments.

c. Within six months from the date of approval of this report, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall and also a warning program to follow in case of emergency conditions.

d. Within thirty days from the date of approval of this report, the following remedial actions should be initiated:

(1) Monitor the seepage at the downstream toe of the dam.

(2) Control trespassing on the dam to help decrease erosion.

(3) Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

e. Within one year from the date of approval of this report the owner should develop written operating procedures and a periodic maintenance plan to ensure the safety of the dam.

APPROVED: James G. Ton

JAMES G. TON
Colonel, Corps of Engineers
District Engineer

DATE: 20 Jan 80

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Lake Ames Dam
Identification No.:	Fed ID No. NJ00337
State Located:	New Jersey
County Located:	Morris
Stream:	Hibernia Brook
River Basin:	Passaic
Date of Inspection:	November 6, 1979

ASSESSMENT OF GENERAL CONDITIONS

Lakes Ames Dam is about 45 years old and in poor condition. It is small in size and classified as significant hazard. There is a major seepage at the downstream toe of the dam near the north abutment and a pool of standing water in a depression near the toe of the dam north of the stoplog spillway discharge channel. The upstream and downstream slopes of the embankment are deeply eroded adjacent to the south side of the stoplog spillway. The upstream slope of the embankment is deeply eroded next to the north side of the principal spillway. Ruins of a concrete wall are visible at several locations on the upstream edge of the crest of the embankment; the concrete is badly deteriorated and the wall is broken and tilted at several locations. A dry stone-masonry wall which retains the downstream toe of the embankment between the stoplog spillway, and the north abutment bulges locally. The slopes and crest of the dam are covered with varying amounts of trees, brush and grass. The combined capacity of the principal, stoplog, and emergency spillways is less than 18 percent of the selected half-PMF and is inadequate.

We recommend that the owner retain the services of a professional engineer, qualified in the design and construction of dams, to accomplish the following in the near future: investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed; design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including rehabilitation or replacement of the deteriorated concrete wall on the upstream edge of the crest of the embankment; design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment; design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel; design and oversee the removal and replacement of the stoplog structure; design and oversee the rebuilding of the spillway cap and abutments; conduct further detailed hydrologic and hydraulic analysis of the watershed, reservoir, dam and spillways to determine the need for and type of mitigating measures required.

We further recommend that, as part of operating and maintenance procedures, the owner monitor seepage at the downstream toe of the dam; control trespassing on the dam to reduce erosion; and clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway. These tasks should commence immediately. In the future, the owner should establish a surveillance program for use during and immediately following periods of heavy rainfall, and also, a warning program to follow in case of emergency conditions. Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.

ANDERSON-NICHOLS & COMPANY, INC.

Warren A. Guinan

Warren A. Guinan
Project Manager
New Jersey No. 16848

6 November 1979

Overview
Lake Ames Dam

CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY REPORT
LAKE AMES DAM N.J. NO. 22-27 FED ID NO. NJ00337

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY INSPECTION PROGRAM
LAKE AMES DAMS
U.S. #NJ00337-N.J. #22-27

SECTION I
PROJECT INFORMATION

1.1 General

a. Authority. Authority to perform the Phase I Safety Inspection of Lake Ames Dam was received from the State of New Jersey, Department of Environmental Protection (NJDEP), Division of Water Resources by letter dated 26 October 1979 under Contract No. FPM-39 dated 28 June 1978. This Authority was given pursuant to the National Dam Inspection Act, Public Law 92-367 and by agreement between the State and the U.S. Army Engineer District, Philadelphia. The inspection discussed herein was performed by Anderson-Nichols & Company, Inc. on 6 November 1979.

b. Purpose. The purpose of the Phase I Investigation is to develop an assessment of the general conditions with respect to the safety of Lake Ames Dam and appurtenances based upon available data and visual inspection, and determine any need for emergency measures and conclude if additional studies, investigations, and analyses are necessary and warranted.

1.2 Project Description

a. Description of Dam and Appurtenances. Lake Ames Dam is a 9-foot high, 287-foot long earthfill and concrete dam. The crest of the embankment is approximately 20 feet wide. The upstream face slopes at about 1H:1V and the slope of the downstream face varies from vertical to 4H:1V. The crest of the embankment section is grass covered. Its upstream face is covered with low shrubs and weeds while the downstream face supports shrubs, weeds, and some trees up to 18 inches in diameter. An emergency spillway is located at the extreme north end of the dam. It is 20 feet long with vertical stone abutments and a rock-lined bottom which forms an uneven crest. A 4-foot long stoplog structure is located near the center of the embankment section. Its concrete walls are bridged by 5 sections of steel rail. The tailrace for the stoplog spillway is bordered by 5-foot high stone wingwalls. The extreme south end of the dam consists of a 45-foot long, 15-foot wide principal spillway. The crest is a concrete cap that sits atop a stone masonry base which forms a vertical outfall. The tailrace for the principal spillway is also bordered by 5-foot high stone-masonry walls running about 15 feet downstream from the vertical outfall. The south abutment of the dam consists of a sandy beach while the north abutment is a steep, partially wooded slope adjacent to N.J. Route 513. Essential features of the dam are given in Figure 1.

b. Location. Lake Ames Dam is located in Morris County, New Jersey, on Hibernia Brook, which flows into Beaver Brook, a tributary of the Rockaway River. The dam is shown on U.S.G.S. Quadrangle, Dover, New Jersey, with approximate coordinates of N 40° 57.1', W 74° 30.1'. A location map has been included as Figure 2.

c. Size Classification. Lake Ames Dam is classified as small on the basis of storage at top of dam of 197 acre-feet, which is less than 1000 acre-feet, but more than 50 acre-feet, and on the basis of structural height of 9 feet, which is less than 40 feet, in accordance with criteria given in the Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification. Visual inspection of the downstream area revealed one inhabited structure located about 6 feet above Hibernia Brook. The breach analysis contained herein indicates that flood stages associated with the half-PMF would reach about 4.5 feet above the sill of the structure. Also, the bridge carrying New Jersey Route 513, a frequently traveled road located about 800 feet downstream of the dam, would be inundated by about 4 feet of water. Appreciable property damage and loss of a few lives could occur. Accordingly, Lake Ames Dam is classified as Significant Hazard.

e. Ownership. The dam is owned by the Township of Rockaway, 19 Mount Hope Road, Rockaway, New Jersey, 07866. The town engineer is Art Deluca; phone: 201/625-3700.

f. Purpose of Dam. The dam provides recreation for the surrounding community.

g. Design and Construction History. No information was disclosed regarding the design and construction of the original dam.

h. Normal Operational Procedures. No operational procedures exist for Lake Ames Dam.

i. Site Geology. No site specific geologic information (such as borings) was available at the time the dam was inspected. Information derived from a report entitled "Engineering Geology of the Northeast Corridor, Washington, DC to Boston, MA" and the Geologic Map of New Jersey (Lewis and Kummel, 1912) indicate that soils within the immediate site area consist of ground moraine overlying bedrock. Although no outcrops were observed during inspection of this dam, the previously mentioned reports indicate that the underlying bedrock consists of granitoid gneiss, with associated migmatite, granulite, amphibolite and granitic rocks of Precambrian age.

1.3 Pertinent Data

a. Drainage Area

5.3 square miles

b. Discharge at Damsite (cfs)

Maximum flood at damsite - unknown

Principal spillway capacity at top of dam - 382

Stoplog spillway capacity at top of dam - 29

Emergency spillway capacity at top of dam - 72

Total spillway capacity at top of dam - 483

Low-level outlet - not applicable

c. Elevation (ft. above NGVD)

Top of dam - 637.1

Recreation pool - 635.0

Spillway crest - 634.9

Maximum pool (½ PMF) - 641.6

Streambed at centerline of principal spillway - 628.7 (downstream); 633.9 (upstream)

Maximum tailwater (estimated) - 632

d. Reservoir Length (feet)

Maximum pool - 1330

Recreation pool - 1300

e. Storage (acre-feet)

Recreation pool - 155

Design surcharge (½ PMF) - 292

Top of dam - 197

f. Reservoir Surface Area (acres)

Top of dam - 16

Recreation pool - 14

Spillway crest - 14

g. Dam

Type - earthfill and concrete

Length - 287 feet

Height - 8 feet (hydraulic)

- 9 feet (structural)

Topwidth - 20 feet

Side slopes - upstream 1H:1V

downstream varies 4H:1V to vertical

Zoning - unknown

Impervious core - unknown

Cutoff - unknown

Grout curtain - unknown

h. Principal Spillway

Type - concrete vertical

Length of weir - 45 feet

Crest elevation - 634.9 NGVD

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - Hibernia Brook

i. Emergency Spillway

Type - rock-lined bottom sloping gradually downward

Length of weir - 20 feet

Crest elevation - 635.5 (low point along crest)

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - tributary to Hibernia Brook

j. Stoplog Spillway

Type - concrete vertical

Length of weir - 4 feet

Crest elevation - 635.2 (top of debris)

Gates - none

Upstream channel - Lake Ames (no approach channel)

Downstream channel - tributary to Hibernia Brook

k. Regulating Outlets

Type - concrete stoplog structure

Length - 4 feet

Access - crest of embankment section

Regulating facilities - none; concrete stoplog structure; stoplogs have been removed.

SECTION 2
ENGINEERING DATA

2.1 Design

No plans, hydraulic or hydrologic data pertinent to Lake Ames Dam were available.

2.2 Construction

No data concerning construction of Lake Ames Dam were disclosed.

2.3 Operation

No engineering operational data were available.

2.4 Evaluation

a. Availability. A search of the NJDEP files and contact with community officials revealed only a limited amount of recorded information.

b. Adequacy. Because of the limited amount of recorded data available, evaluation of this dam was based solely on visual observations.

c. Validity. Information disclosed by community officials appears to concur with that obtained by the inspection team.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. Dam. A major seepage was observed at the downstream toe of the dam near the north abutment. There is also a pool of standing water in a depression near the toe of the dam north of the stoplog spillway discharge channel. The upstream and downstream slopes of the embankment are deeply eroded next to the south side of the concrete stoplog spillway structure. The upstream slope of the embankment is deeply eroded next to the north side of the principal spillway. Deep erosion channels are present on the upstream side of the south abutment which is a sandy parking and access area. Minor erosion of the upstream slope has occurred at several locations due to both trespassing and wave action. An apparent remnant of a concrete wall is visible at several locations on the upstream edge of the crest of the embankment; the concrete is badly deterioriated and the wall is broken and tilted at several locations. A dry-stone-masonry wall which retains the downstream toe of the embankment between the stoplog spillway and the north abutment bulges locally and is toppled over locally. The crest of the dam is covered with coarse weeds. The upstream slope of the dam is covered with brush. The downstream slope of the dam is covered with trees, brush, and cut brush.

b. Appurtenant Structures. Trees are growing at the entrance to the emergency spillway channel. A large tree is growing immediately behind the stone-masonry training wall on the north side of the discharge channel immediately downstream of the principal spillway. The west side of concrete capped spillway and its concrete abutments are badly cracked and deteriorated. The stoplog spillway near the center of the dam is severely deteriorated. The upstream concrete walls have collapsed into the intake channel and effectively block it. The steel stoplog supports are badly corroded. The south wall of the stoplog structure has a large hole in it through which water flows from the embankment south of the wall and into the spillway channel.

c. Reservoir Area. The watershed above the lake is moderately sloping and wooded. There are no buildings on the shore of the lake. The slopes on the shore of the lake appear to be stable. No evidence of significant sedimentation was observed.

d. Downstream Channel. Trees overhang the channels downstream of the principal spillway, the stoplog spillway and the emergency spillway. In addition, there are logs, brush and debris in the discharge channel below the stoplog spillway, and there is brush growing in the discharge channel below the emergency spillway.

SECTION 4
OPERATIONAL PROCEDURES

4.1 Procedures

No formal operational procedures for Lake Ames Dam exist.

4.2 Maintenance of Dam

No formal maintenance procedures for the dam were disclosed. From a phone conversation with the Town Engineer, Art Deluca, it was learned that "the area around the pond will be spruced up" as part of the facelifting program dealing with several recreational areas in the town.

4.3 Maintenance of Operating Facilities

No formal maintenance procedures for the operating facilities exist. The stoplog structure appears to have been undergoing decay for quite a few years.

4.4 Warning System

No warning system exists for Lake Ames Dam.

4.5 Evaluation of Operational Adequacy

Because of the lack of operation and maintenance procedures, the remedial measures described in Section 7.2 should be implemented as prescribed.

SECTION 5
HYDROLOGIC/HYDRAULIC

5.1 Evaluation of Features

a. Design Data. An evaluation could not be performed because no data were disclosed.

b. Experience Data. Investigation of the files at the NJDEP and telephone contact with the Township of Rockaway yielded no data concerning past overtopping or flood heights at Lake Ames Dam.

c. Visual Observations. Erosion of the embankment section was noted adjacent to the south wall of the stoplog spillway. Water is passing through a hole in the stoplog structure concrete wall and discharging back into the spillway. The entrance to the spillway is almost completely blocked with debris. There was no visual evidence of damage to the structure caused by overtopping.

d. Overtopping Potential. The hydraulic/hydrologic evaluation for Lake Ames Dam is based on a Spillway Design Flood (SDF) equal to one-half the Probable Maximum Flood (PMF) in accordance with the range of test floods given in the evaluation guidelines for dams classified as high hazard and small in size. The PMF was determined by application of the SCS dimensionless unit hydrograph to a 24-hour probable maximum storm of 22.7 inches. Hydrologic computations are shown in Appendix 3. The routed half-PMF peak discharge resulting from the combination of flow from sub-areas 1 & 2 (see sketch, Appendix c, p. 5/16) is 8,569 cfs.

Water will rise to a depth of 2.2 feet above the spillway crest before overtopping the low section along the dam embankment crest. Under this head, the combination of the principal, emergency, and stoplog spillways will pass a total flow of 483 cfs, which is less than the selected SDF.

Flood routing calculations indicate that Lake Ames Dam will be overtopped for about 9 hours to a maximum depth of 4.5 feet under half-PMF conditions. It is estimated that the spillways can pass less than 18 percent of the half-PMF before overtopping of the dam occurs; thus, the spillway is considered inadequate.

The dam was initially classified as significant hazard based on visual observation. A breach analysis was performed to assess the increase in downstream hazard under dam failure conditions and determine if the dam might be high hazard. The results of the breach analysis, contained in Appendix 3, show that the downstream potential for loss of life and excessive property damage is not increased under dam failure conditions. However, the analysis does indicate that heavily traveled N.J. Route 513 will

be inundated by up to 4 feet of water and that one house about 2000 feet downstream of the dam could be inundated above the first floor sill by 4.5 feet of water. Flow velocities at these locations would be very high.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

Major seepage near the north abutment and standing water in a depression north of the stoplog spillway discharge channel are indicative of seepage through and under the dam, which, if not properly controlled, could lead to failure of the dam. Deep erosion of both the upstream and downstream slopes of the dam could result in breaching of the dam if allowed to continue. A concrete wall on the upstream edge of the crest, which may have been intended to control erosion or seepage, is in such poor condition that it cannot be relied upon for either of these purposes. Local failures of the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment could initiate seepage and erosion problems if allowed to continue. Trees growing on the downstream slope and in the downstream toe area, and brush which is now growing on the upstream and downstream slopes and may attain tree-size eventually, may cause seepage and erosion problems if a tree blows over and pulls out its roots or if a tree dies or is cut and its roots rot. Based on the visual inspection alone it is not possible to determine the character of the dam foundation or the interior of the cross section. Therefore, it is not possible to evaluate the factor of safety of the dam against slope failure. The severe deterioration of the spillway abutments and stoplog facility, if allowed to progress, could result in failure of the structure.

6.2 Design and Construction Data

No design or construction data pertinent to the structural stability of the dam were available.

6.3 Operating Records

No operating records pertinent to the structural stability of the dam were found.

6.4 Post-Construction Changes

No records pertinent to post-construction changes were disclosed.

6.5 Seismic Stability

Lake Ames Dam is located in Seismic Zone 1. According to the Recommended Guidelines, dams located in Seismic Zone 1 "may be assumed to present no hazard from earthquake provided static stability conditions are satisfactory and conventional safety margins exist". However, because no data are available concerning the engineering properties of the embankment and foundation materials for this dam or of the below-ground configuration of the concrete walls in the dam, it is not possible to make an engineering evaluation of the stability of the slopes or the factor of safety under static conditions.

SECTION 7
ASSESSMENT, RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Condition. Lake Ames Dam is about 45 years old and is in poor condition.

b. Adequacy of Information. The information available is such that the assessment of the dam must be based on the results of the visual inspection. The presence of coarse weeds on the crest of the embankment, brush on the upstream slope, and brush, trees, and piles of cut brush on the downstream slope make it impossible to inspect the dam adequately.

c. Urgency. The recommendations made in 7.2 a. and 7.2 b. should be implemented by the owner as prescribed.

d. Necessity for Additional Data/Evaluation. The information available from the visual inspection is adequate to identify the potential problems which are listed in 7.2 a. These problems require the attention of a professional engineer who will have to make additional engineering studies to design or specify remedial measures. If left unattended, the problems could lead to failure of the dam. The dam should be reinspected after the trees, brush, and weeds have been cleared from the embankment.

7.2 Recommendations/Remedial Measures

a. Recommendations. The owner should engage a professional engineer experienced in the design and construction of dams to do the following things in the near future:

1. Investigate the seepage and standing water at the toe of the dam and design remedial or control measures, if needed.

2. Design and oversee repairs for eroded areas on the upstream and downstream slopes of the dam, including removal or replacement of the deterioriated concrete wall on the upstream edge of the crest of the embankment.

3. Design and oversee procedures for removing or rehabilitating the dry stone-masonry retaining wall at the downstream toe of the embankment between the stoplog spillway and the north abutment.

4. Design and oversee procedures for the removal of trees and brush from the upstream slope, downstream slope, and a zone 25 feet wide at the downstream toe of the embankment, and for removal of the tree behind the stone-masonry training wall on the south side of the principal spillway discharge channel.

5. Design and oversee the removal and replacement of the stoplog facility.

6. Design and oversee the rebuilding of the spillway cap and abutments.

7. Conduct further detailed hydrologic and hydraulic analyses for the watershed, reservoir, dam and spillways to determine the need for and type of mitigating measures required.

b. Operating and Maintenance Procedures. The owner should undertake the following things imemdiately:

1. Monitor the seepage at the downstream toe of the dam.

2. Control trespassing on the dam to reduce erosion.

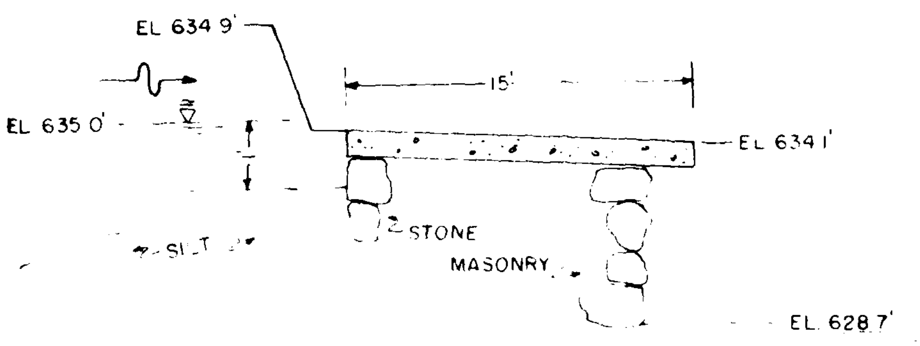
3. Clear brush, logs and debris from the channels downstream of the stoplog spillway and emergency spillway and from the entrance channel to the emergency spillway.

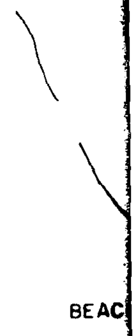
The Owner should undertake the following things in the near future:

1. Establish a surveillance porgram for use during and immediately following periods of heavy rainfall.

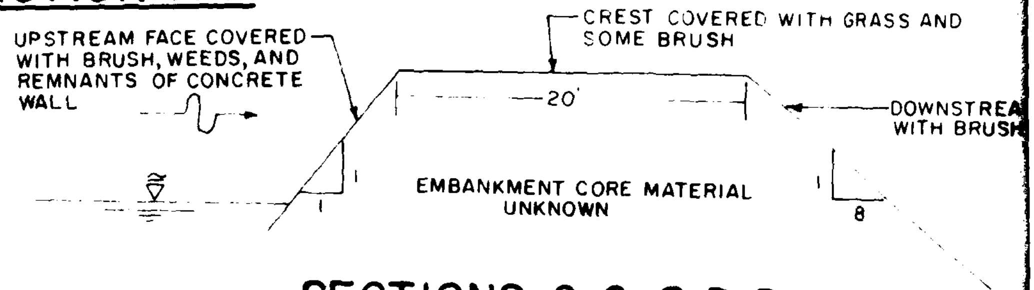
2. Establish a warning program to follow in case of emergency conditions.

Within one year from the date of approval of this report, the owner should develop written operating procedures and a periodic maintenance plan to insure the safety of the dam.

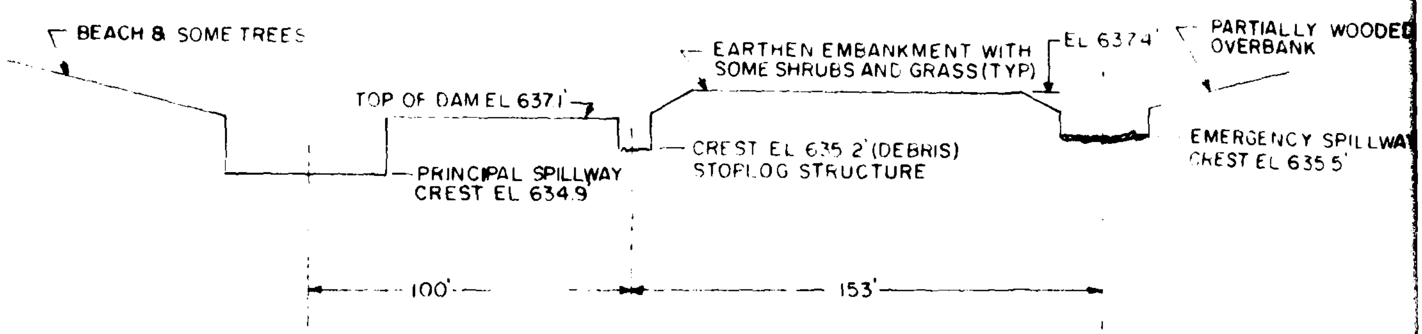




SECTION A-A

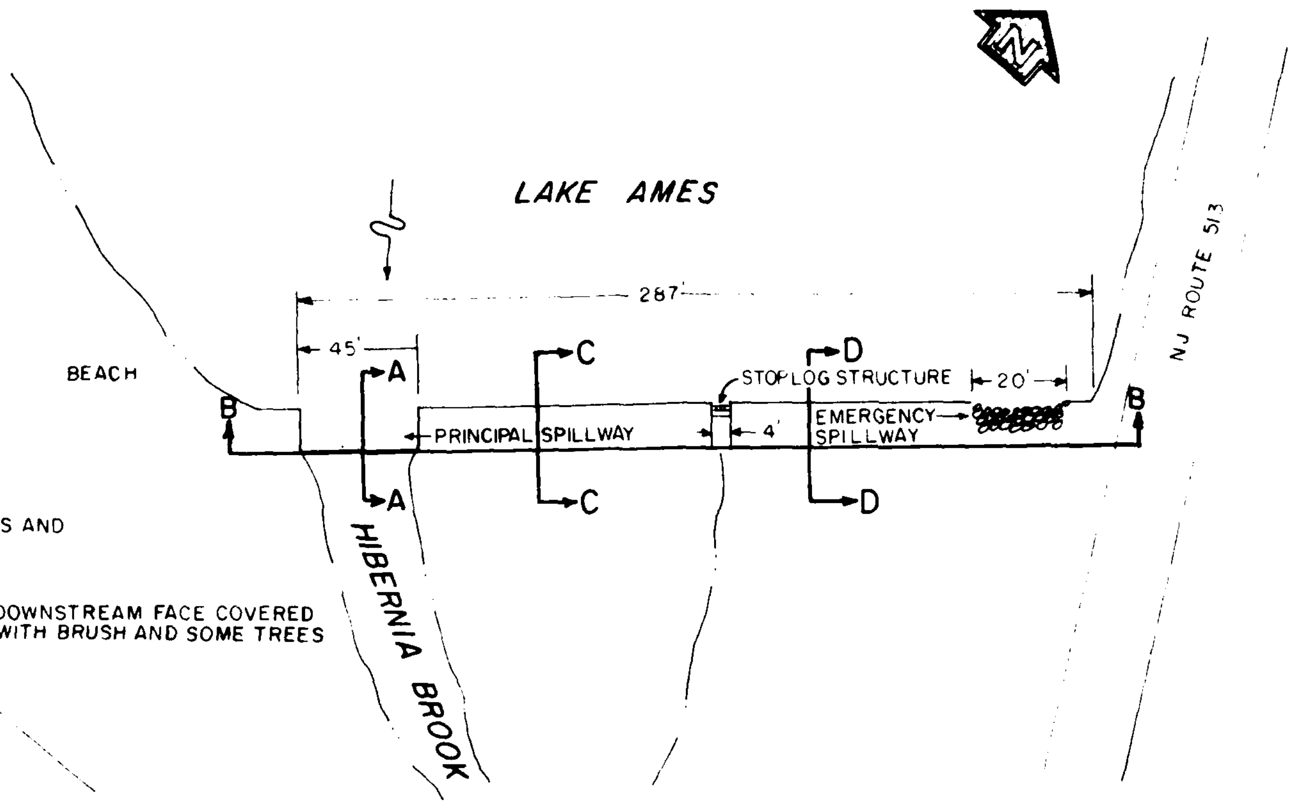


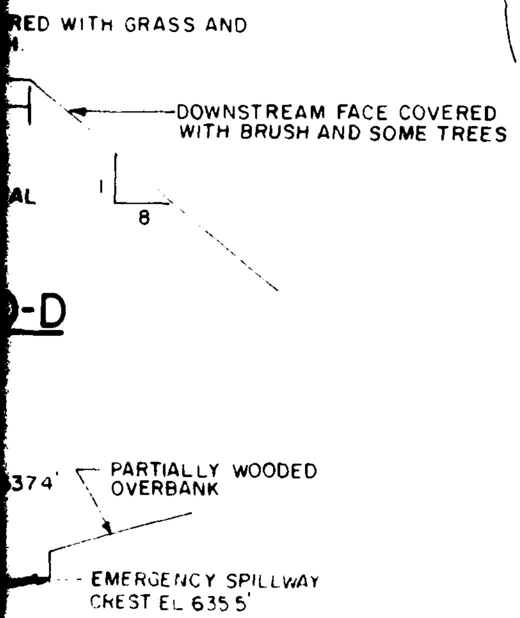
SECTIONS C-C & D-D



ELEVATION B-B

2





PLAN

DETAIL FROM FIELD INSPECTION 11/6/79

Anderson-Nichols & Co, Inc CONCORD NEW HAMPSHIRE	U.S. ARMY ENGINEER DIST PHILADELPHIA CORPS OF ENGINEERS PHILADELPHIA, PA

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE AMES DAM

HIBERNIA BROOK NEW JERSEY

SCALE NOT TO SCALE

DATE JANUARY 1980

FIGURE - 1

1

SCALE IN MILES

0 5 10

MAP BASED ON STATE OF NEW JERSEY OFFICIAL HIGHWAY MAP AND GUIDE.

Anderson-Nichols & Co., Inc.
CONCORD NEW HAMPSHIRE

U.S. ARMY ENGINEER DIST. PHILADELPHIA
CORPS OF ENGINEERS
PHILADELPHIA, PA.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE AMES DAM LOCATION MAP

HIBERNIA BROOK NEW JERSEY

SCALE: SEE BAR SCALE

DATE JANUARY 1980

FIGURE - 2

APPENDIX 1

CHECK LIST

VISUAL INSPECTION

LAKE AMES DAM

Check List
Visual Inspection
Phase 1

Name Dam Lake Ames Dam County Morris State NJ Coordinators NJDEP

Date(s) Inspection Nov. 6, 1979 Weather cool, cloudy Temperature 48° F

Pool Elevation at Time of Inspection 635.0 NGVD Tailwater at Time of Inspection 629.3 NGVD

Inspection Personnel:

Warren Guinan | Ronald Hirschfeld
Stephen Gilman
Kenneth Stuart

Gilman/Hirschfeld Recorder

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	Upstream concrete wall visible only partial length of dam. Top of wall is badly deteriorated and spalled; many areas of cracking.	Rebuild upstream concrete wall.
STRUCTURAL CRACKING		
VERTICAL AND HORIZONTAL ALIGNMENT		
MONOLITH JOINTS		
CONSTRUCTION JOINTS	None visible.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	Stone retaining wall at toe of dam between left abutment and stoplog spillway is bulging locally and has toppled over locally.	Rebuild downstream toe of dam.
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Erosion at many localized sections of upstream slope due to wave action and trespassing.	Repair eroded areas. Clear brush now growing on upstream slope. Establish grassy vegetation and place erosion protection.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Good.	
RIPRAP FAILURES	No riprap. Apparent remnant of a concrete wall badly deteriorated and toppled over locally, along upstream edge of crest from left abutment to stoplog spillway.	See note under "Sloughing or Erosion..." above.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
RAILINGS	No railings.	
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	Major erosion at right side of stoplog spillway and left side of principal spillway.	Repair erosion next to principal and stoplog spillway structure.
ANY NOTICEABLE SEEPAGE	Major seepage near toe of dam near left abutment. Water standing in depression downstream of dam to right of stoplog spillway channel.	Engage engineer to investigate source of seepage and to design appropriate remedial measures.
STAFF GAGE AND RECORDER	None observed.	
DRAINS	None observed.	

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Concrete capped stone masonry; concrete apron badly cracked and spalled. Middle construction joint is eroded. Right abutment is badly cracked, spalled, and undermined. Top is tipped approximately 2". Left abutment badly undermined and tipped. Large piece of concrete wall missing at upstream end of abutment.	Rebuild concrete spillway and training wall.
APPROACH CHANNEL	Wide and unobstructed.	
DISCHARGE CHANNEL	Trees overhang channel. Channel bottom covered with boulders.	Clear trees and brush on either side of channel to prevent channel blockage. Maintain cleared area free of brush.
BRIDGE AND PIERS OVER SPILLWAY		

GATED SPILLWAY

(STOPLOG SPILLWAY)

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WALLS	Both walls of channel are badly eroded and spalled. Concrete core wall near channel has large hole in it where water is discharging. Steel rails across channel are rusted. Upstream end of channel has collapsed, blocking some flow area.	Remove and replace stoplog spillway.
APPROACH CHANNEL	Debris filled.	
DISCHARGE CHANNEL	Logs, brush, debris and uprooted trees clog channel at several locations.	Clear channel of debris from dam to highway bridge downstream. Clear trees and brush on either side of channel for a distance downstream from dam. Maintain cleared areas free of brush.
BRIDGE AND PIERS	None.	
GATES AND OPERATION EQUIPMENT	Stoplogs - visible portions badly deteriorated. Steel slots badly corroded and separated from concrete.	Remove and replace stoplog spillway.

EMERGENCY SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
WEIR	6-12 inch diameter rocks resting on soil. Some weeds.	No action required.
APPROACH CHANNEL	Wide and unobstructed.	
DISCHARGE CHANNEL	Rocks and some weeds and brush. 2' high stone masonry walls form sides.	
BRIDGE AND PIERS OVER SPILLWAY	None.	

INSTRUMENTATION

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None observed.	
OBSERVATION WELLS	None observed.	
WEIRS	None observed.	
PIEZOMETERS	None observed.	
OTHER	None observed.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Moderately sloping and wooded.	
SEDIMENTATION	No evidence of significant sedimentation observed.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Good. Some trees overhang channel immediately downstream of dam. Route 513 and Miggen Road bridges located about 800 and 900 feet downstream, respectively, of the dam.	
SLOPES	Mostly wooded, stable. 20H:1V	
APPROXIMATE NO. OF HOMES AND POPULATION	*One home in floodpath - estimated population* of 2-4 people.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION

ITEM	REMARKS
PLAN OF DAM	None disclosed.
REGIONAL VICINITY MAP	Prepared for this report.
CONSTRUCTION HISTORY	None disclosed.
TYPICAL SECTIONS OF DAM	None.
HYDROLOGIC/HYDRAULIC DATA	None.
OUTLETS - PLAN	None.
- DETAILS	None.
- CONSTRAINTS	None.
- DISCHARGE RATINGS	None.
RAINFALL/RESERVOIR RECORDS	None.

ITEM	REMARKS
DESIGN REPORTS	None disclosed.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.

ITEM	REMARKS
MONITORING SERVICES	None.
MODIFICATIONS	None.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION RECORDS	None.

ITEM	REMARKS
SPILLWAY PLAN	
SECTIONS	Prepared for this report from field inspection data.
DETAILS	None.
OPERATING EQUIPMENT	None.
PLANS & DETAILS	None.

CHECK LIST
HYDROLOGIC AND HYDRAULIC DATA
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 5.3 sq. miles, partially wooded, hilly

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 635.0 NGVD (155 acre-feet)

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): not applicable

ELEVATION MAXIMUM DESIGN POOL: 641.6 NGVD (half-PMF)

ELEVATION TOP DAM: 637.1 NGVD

CREST: Principal spillway - unrestricted flow over concrete

a. Elevation 634.9 NGVD (upstream edge)

b. Type concrete capped vertical

c. Width 15'

d. Length 45'

e. Location right end

f. Number and Type of Gates none

STOPLOG SPILLWAY: restricted flow (clogged with debris)

a. Elevation 635.2 NGVD (top of debris)

b. Type - wooden stoplogs - vertical; stoplogs no longer in place

c. Width 20 feet

d. Length 4 feet

e. Location Spillover center of dam

EMERGENCY SPILLWAY unrestricted flow over rocks

a. Elevation 635.5 NGVD (low point)

b. Type rock-lined bottom, stone wall sides

c. Width varies

d. Length 20 feet

e. Location Spillover left end of dam

OUTLET WORKS: 4-foot long stoplog structure

a. Type concrete vertical

b. Location center of embankment section

c. Entrance Inverts 635.2 NGVD (top of debris)

d. Exit Inverts 628.4 NGVD

e. Emergency Draindown Facilities none

HYDROMETEORLOGICAL GAGES: none

a. Type

b. Location

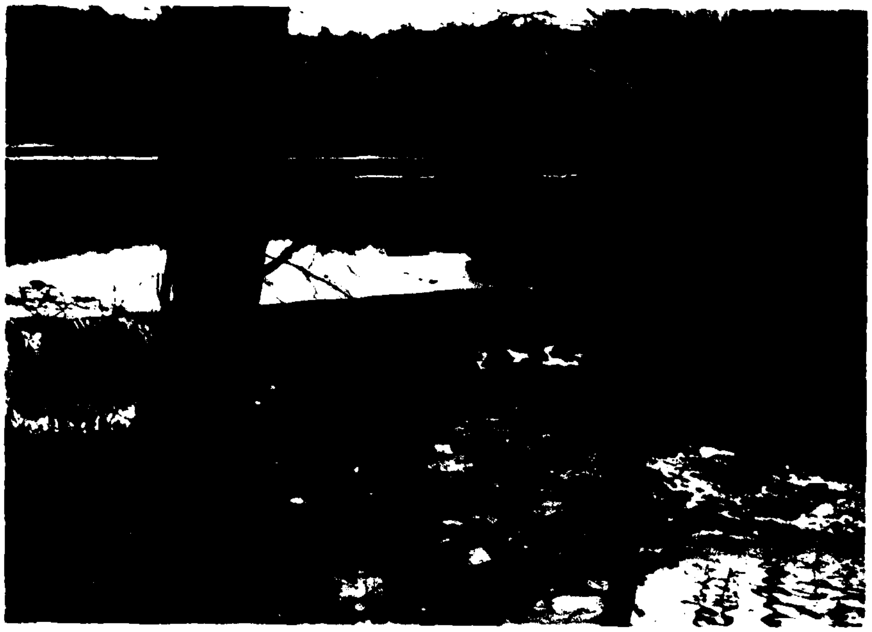
c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 483 cfs

APPENDIX 2

PHOTOGRAPHS

LAKE AMES DAM



6 November 1979
Looking northwest at downstream face of prinicpal spillway.

6 November 1979
Looking east at downstream channel just below principal spillway.

6 November 1979
Looking west at upstream reservoir.

6 November 1979
Looking north across principal spillway crest. Note erosion on upstream face of north spillway abutment.

6 November 1979
Looking west at downstream face of stoplog spillway structure.

6 November 1979
Looking northwest across stoplog spillway structure. Note leak through main dam wall and cracking and spalling of concrete.

6 November 1979
Looking south across dam crest from north abutment. Note engineer standing on emergency spillway crest in foreground.

6 November 1979
Looking downstream through emergency spillway.

6 November 1979

Seepage at downstream toe of dam near north abutment.

6 November 1979

Looking downstream through culvert below N.J. Route 513 bridge encountered about 800 feet downstream of Lake Ames Dam.

LAKE AMES DAM

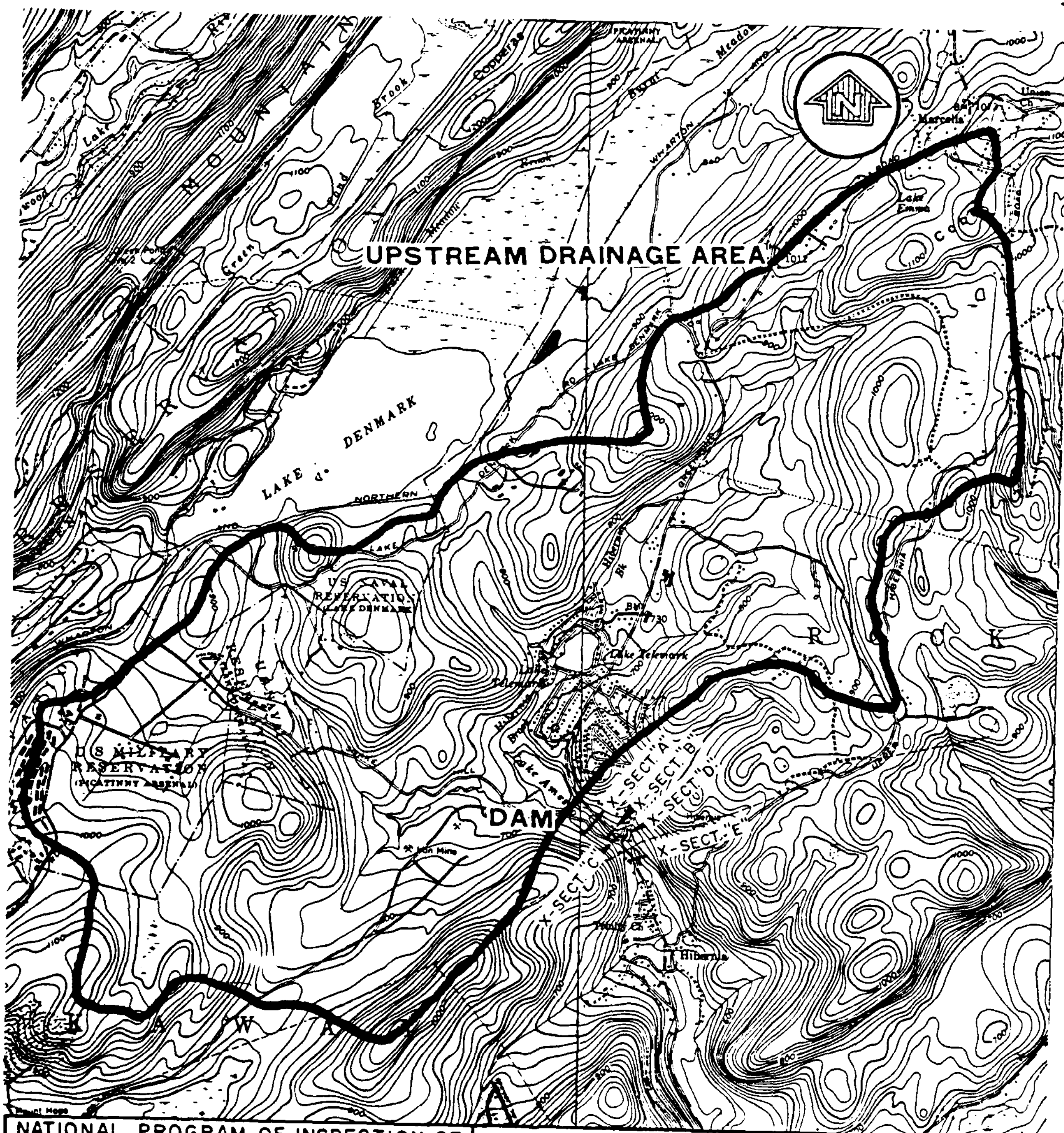
6 November 1979
Looking downstream from N.J. Route 513 bridge at second bridge encountered downstream of dam.

6 November 1979
Looking southeast at downstream channel just below second bridge downstream of dam.

APPENDIX 3

HYDROLOGIC COMPUTATIONS

LAKE AMES DAM



NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

LAKE AMES DAM

ROCKAWAY TOWNSHIP, NEW JERSEY

REGIONAL VICINITY MAP

JANUARY 1980

DEPARTMENT OF THE ARMY
PHILADELPHIA DISTRICT, CORPS OF ENGINEERS
PHILADELPHIA, PENNSYLVANIA

ANDERSON-NICHOLS & CO., INC. CONCORD, NH

SCALE IN MILES

0 1/2 1

MAP BASED ON U.S.G.S. 7.5 MINUTE QUADRANGLE SHEETS. DOVER, N.J. 1954. REVISED 1970. AND BOONTON, N.J. 1954. REVISED 1970.

Anderson-Nichols & Company, Inc.

Subject LAKE AMES

JOB NO. 3409-03

Sheet No. 1 of 16
Date 2 Jan 80
Computed [illegible]
Checked TDD

SQUARES 1/4 IN. SCALE

HYDROLOGIC COMPUTATIONS

Drainage area = 5.3 mi^2

Lake surface area (normal pool) = 14 acres

Evaluation criteria
size: small
hazard: high

Spillway design flood
Based on size and hazard classification, the spillway design flood will be one half the probable maximum flood (1/2 PMF).

Anderson-Nichols & Company, Inc.   Subject LAKE AMES   Sheet No. 2 of 16

JOB NO. 3409-03   Date 2 Jan 80   Computed [illegible]   Checked [illegible]

SQUARES 1/4 IN SCALE

DETERMINE TIME OF CONCENTRATION, T_C

Method 1 *

Estimate velocity

overland flow
reach length = 1200 ft.
slope = $\frac{990-955}{1200}$ = 0.03
from table; mostly "woodlands",
average velocity = 1 fps

channel flow
reach length = 11,300 ft.
slope = $\frac{955-635}{11,300}$ = 0.03
from table, average velocity = 1 fps

$T_C = \frac{1200}{1} + \frac{11,300}{1} = 12,500$ sec = 3.47 hr

Method 2 ▽

from group C, runoff curve No. = 70

from nomograph, T_L = 1.35 hr.

$T_C = 1.67\,T_L = 1.67(1.35)$ = 2.25 hr.

* See Appendix 4, reference 5.

▽ See Appendix 4, reference 3.

Method 3 *

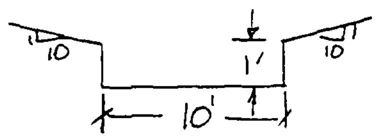
Overland flow
slope = 0.03 (see Method 1)

flow occurs mostly through woodlands;

from plot of % slope vs. velocity,

$V = 0.45$ fps

Channel flow
estimate channel shape



assume depth of water in channel = 1 ft.

$A = 10(1) = 10\ ft^2$

$R = \frac{A}{WP} = \frac{10}{2(1)+10} = 0.83$ ft.

$V = \frac{1.49}{n} R^{2/3} S^{1/2}$

$S = 0.03,\ R = 0.83,\ n = 0.045$

from Manning's nomograph; $V = 4.8$ fps

$T_c = \frac{1200}{0.45} + \frac{11,300}{4.8} = 5021$ sec $= \underline{1.39 \text{ hr}}$

* See Appendix 4, reference 7.

Anderson-Nichols & Company, Inc.

JOB NO. 3409-03

Subject LAKE AMES

Sheet No. 4 of 16

Date

Computed

Checked

SCALES 1/4 IN SCALE

Method 4 *

$$T_C = 0.83\left(\frac{NL}{\sqrt{S}}\right)^{0.467}$$ for overland flow

overland flow

$N = 0.60,\ S = 0.03,\ L = 1200$ ft.

$$T_{C_{OV}} = 0.83\left(\frac{0.60(1200)}{\sqrt{0.03}}\right)^{0.467} = 40.6 \text{ min.}$$

channel flow

from Manning's nomograph, $V = 4.8$ fps (see Method 3)

$$T_{C_{CH}} = \frac{11,300}{4.8} = 2354 \text{ sec} = 39 \text{ min.}$$

$$T_C = 40.6 + 39 = 79.6 \text{ min} = \underline{1.33 \text{ hr}}$$

$$T_{C_{AVG}} = \frac{1.33 + 1.39 + 2.25 + 3.47}{4} = \underline{2.11 \text{ hr}}$$

$$T_{LAG} = 0.6T_C = 0.6(2.11) = \underline{1.27 \text{ hr}}$$

* See Appendix 4, reference 7.

P. 5/14/16
[illegible]
3 Jan 80

KEY

OVERLAND FLOW FROM MOST REMOTE POINT IN DRAINAGE AREA

CHANNEL FLOW

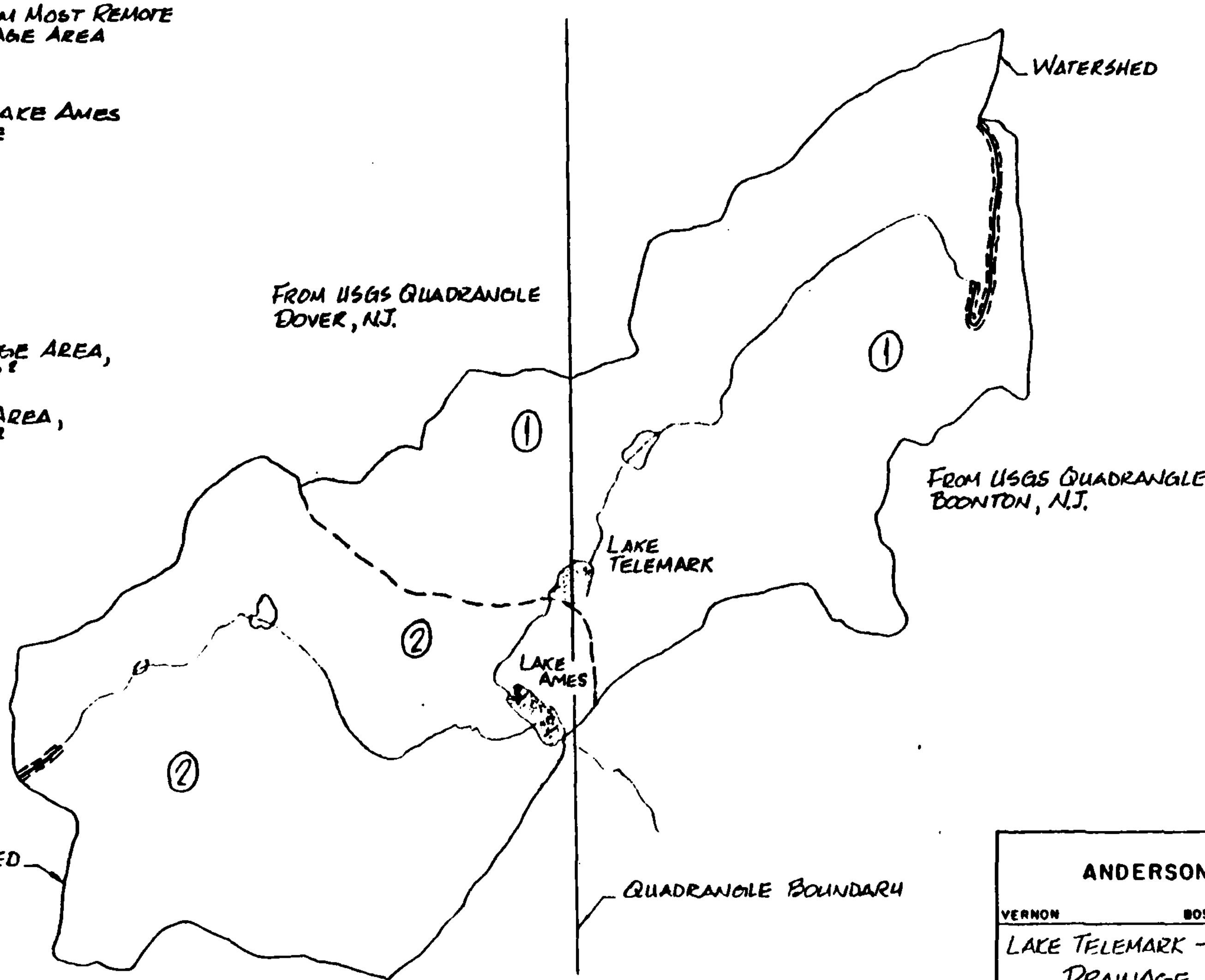
LAKE TELEMARK - LAKE AMES DRAINAGE DIVIDE

AREA

LAKE TELEMARK DRAINAGE AREA, SUB-AREA (1) ≐ 2.5 MI^2

LAKE AMES DRAINAGE AREA, SUB-AREA (2) ≐ 2.8 MI^2

TOTAL AREA = 5.3 MI^2

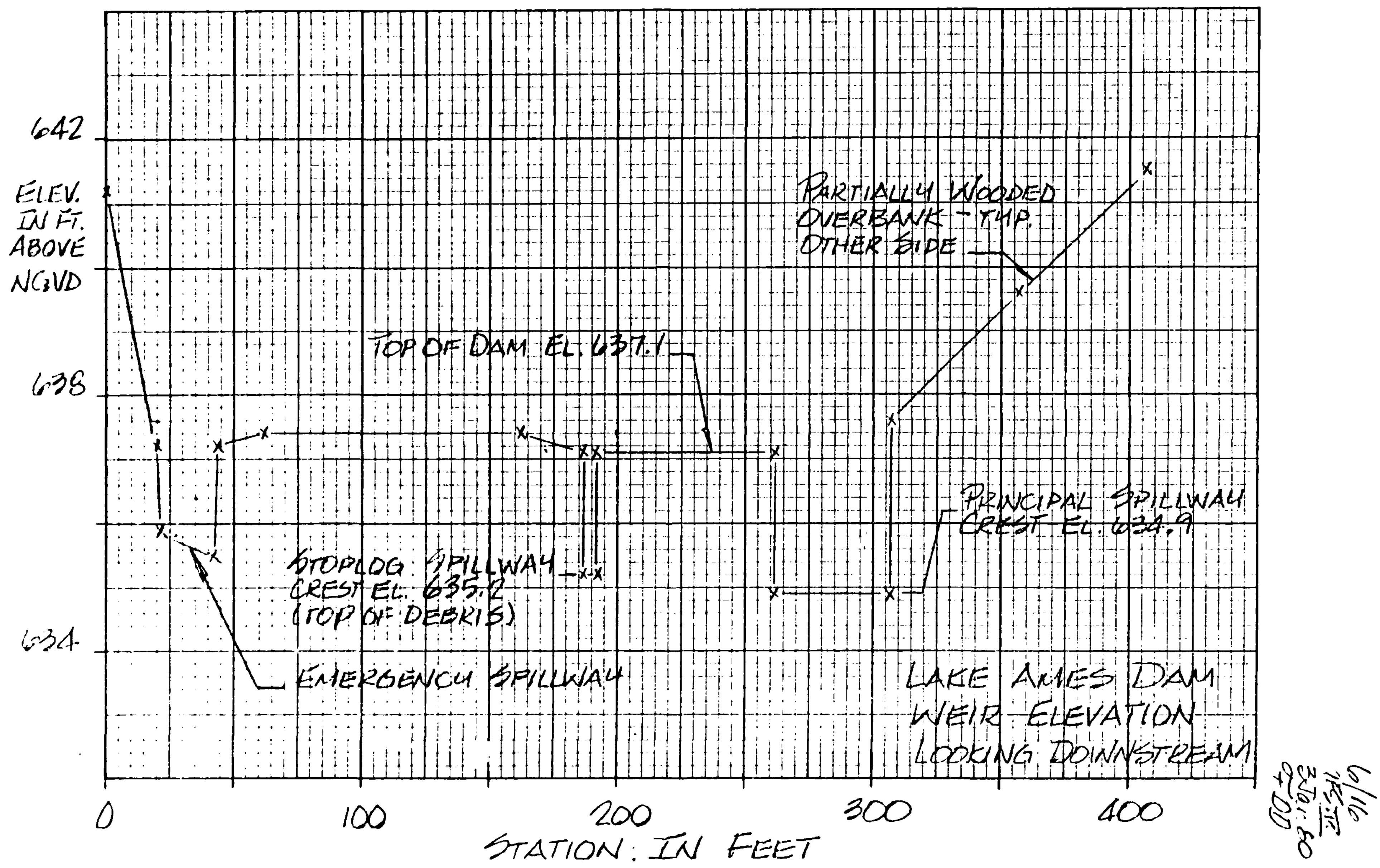


ANDERSON-NICHOLS

VERNON BOSTON CONCORD

LAKE TELEMARK - LAKE AMES DRAINAGE SCHEMATIC

DATE 28 DEC 79	SCALE:	JOB NO. 3409-05,03	SHEET NO.


642
638
634
ELEV. IN FT. ABOVE NGVD
0
100
200
300
400
STATION: IN FEET
TOP OF DAM EL. 637.1
PARTIALLY WOODED OVERBANK - TYP. OTHER SIDE
STOPLOG SPILLWAY CREST EL. 635.2 (TOP OF DEBRIS)
EMERGENCY SPILLWAY
PRINCIPAL SPILLWAY CREST EL. 634.9
LAKE AMES DAM
WEIR ELEVATION
LOOKING DOWNSTREAM
6/16
3 Jan. 80

SCALES 1/4 IN SCALE

DEVELOP RATING CURVE AT DAM

Flow over principal spillway

Use weir equation, $Q = CLH^{3/2}$

where $C = 2.6$*
$L = 2$ ft.
H varies

Flow over stoplog spillway

Use weir equation, $Q = CLH^{3/2}$

where $C = 2.8$*
$L = 4$ ft.
H varies

Flow over emergency spillway and dam crest

Use weir equation, $Q = CLH^{3/2}$

where $C = 2.5$
L & H vary

* From table 5-3, p. 5-40, Brater & King, Handbook of Hydraulics.

Anderson-Nichols & Company, Inc.

Subject LAKE AMES

JOB NO. 3409-03

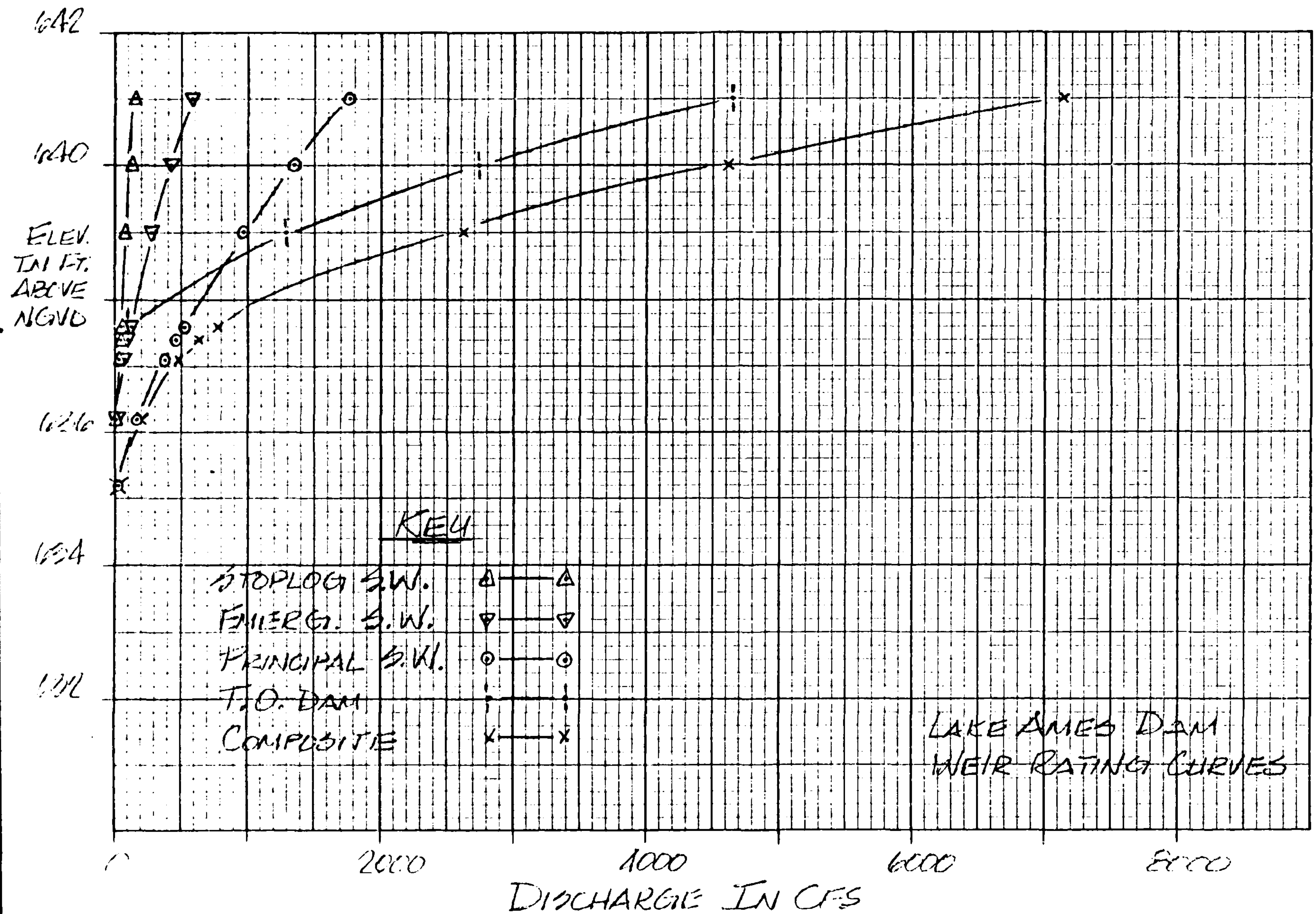
Sheet No. 8 of 16
Date
Computed
Checked

ELEVATION (FT. ABOVE NGVD)	SPILLWAYS						TOP OF DAM			Q TOTAL
	PRINCIPAL		EMERGENCY		STOPLOG					
	HD (ft)	Q (cfs)	HD° (ft)	Q (cfs)	HD (ft)	Q (cfs)	HEAD* (ft)	LENGTH (ft)	Q ▽ (cfs)	
634.9										0
635.2	0.3	19								19
636.2	1.3	173	0.7	15	1.0	12				200
637.1	2.2	382	1.6	72	1.9	29				483
637.4	2.5	462	1.9	98	2.2	37	0.3	92	36	633
637.6	2.7	519	2.1	117	2.4	42	0.3	236	101	779
639.0	4.1	971	3.5	279	3.8	83	1.6	257	1288	2621
640.0	5.1	1348	4.5	421	4.8	118	2.5	272	2731	4618
641.0	6.1	1763	5.5	582	5.8	156	3.5	287	4639	7140

° Head above lowest point on non-level crest.

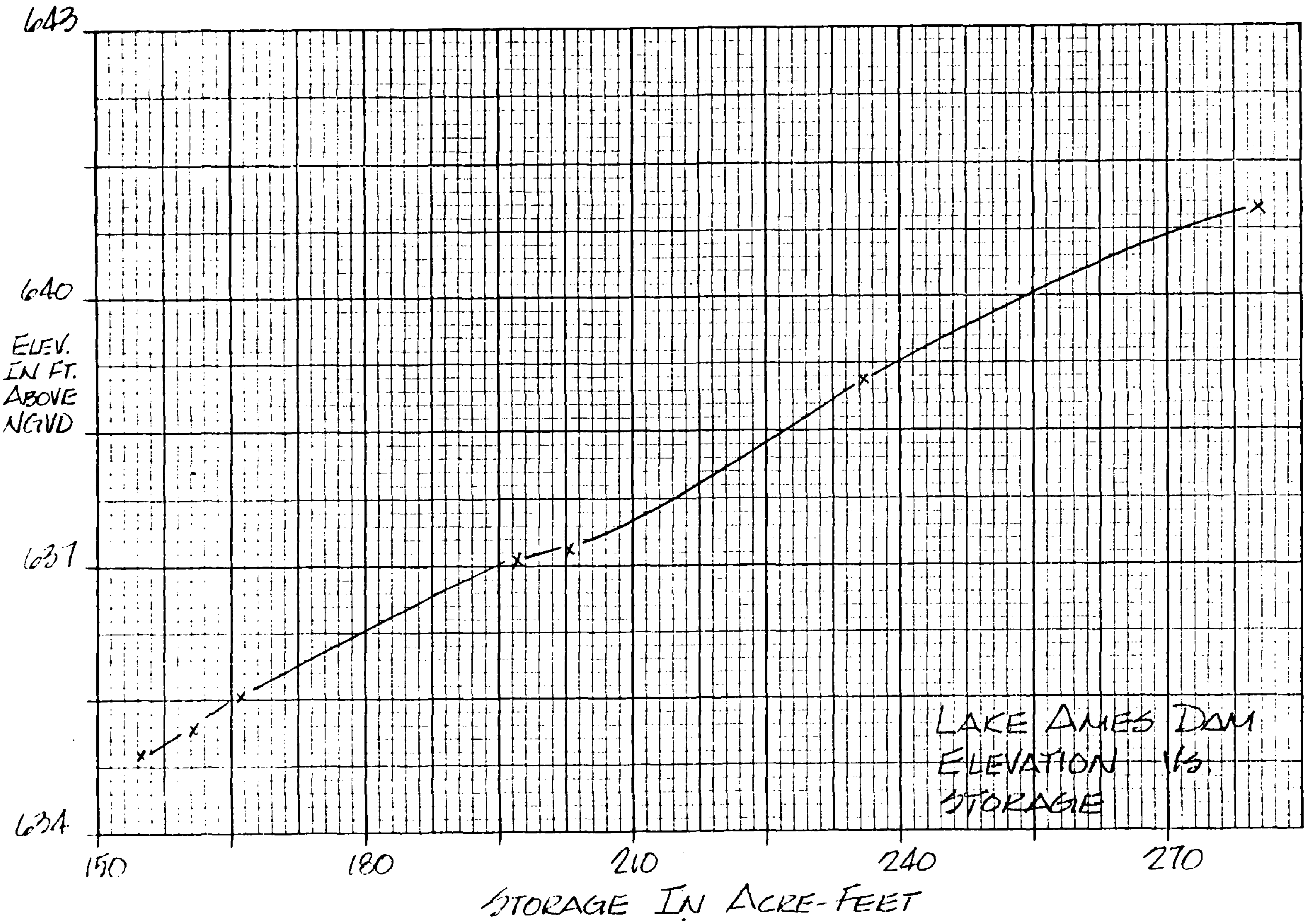
* Average value

▽ $Q = CLH^{3/2}$ where $C = 2.5$

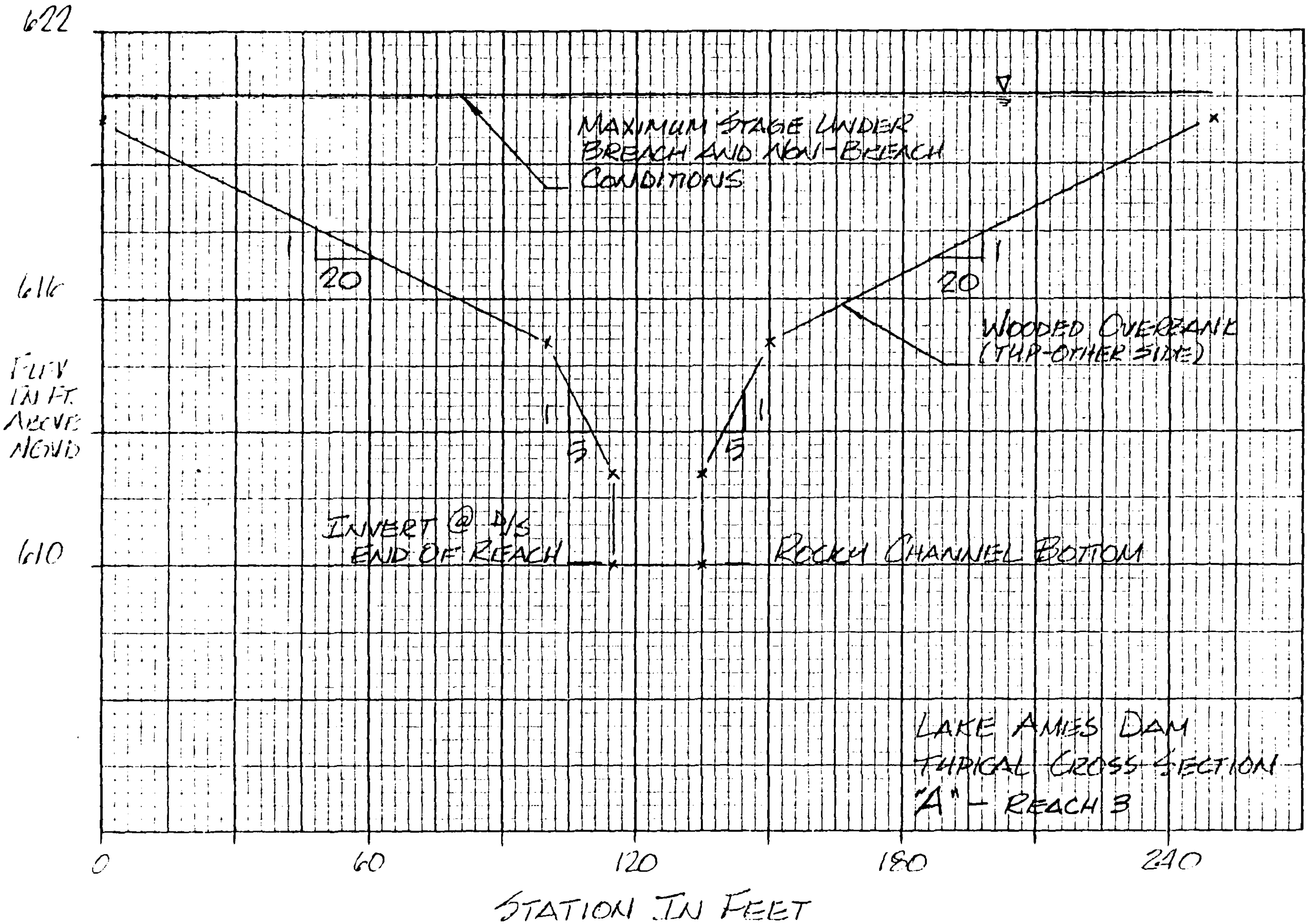

642
640
ELEV. IN FT. ABOVE NGVD
636
634
632
0
2000
4000
6000
8000
DISCHARGE IN CFS
KEY
STOPLOG S.W.
EMERG. S.W.
PRINCIPAL S.W.
T.O. DAM
COMPOSITE
LAKE AMES DAM
WEIR RATING CURVES

9/16
3 Jan 80

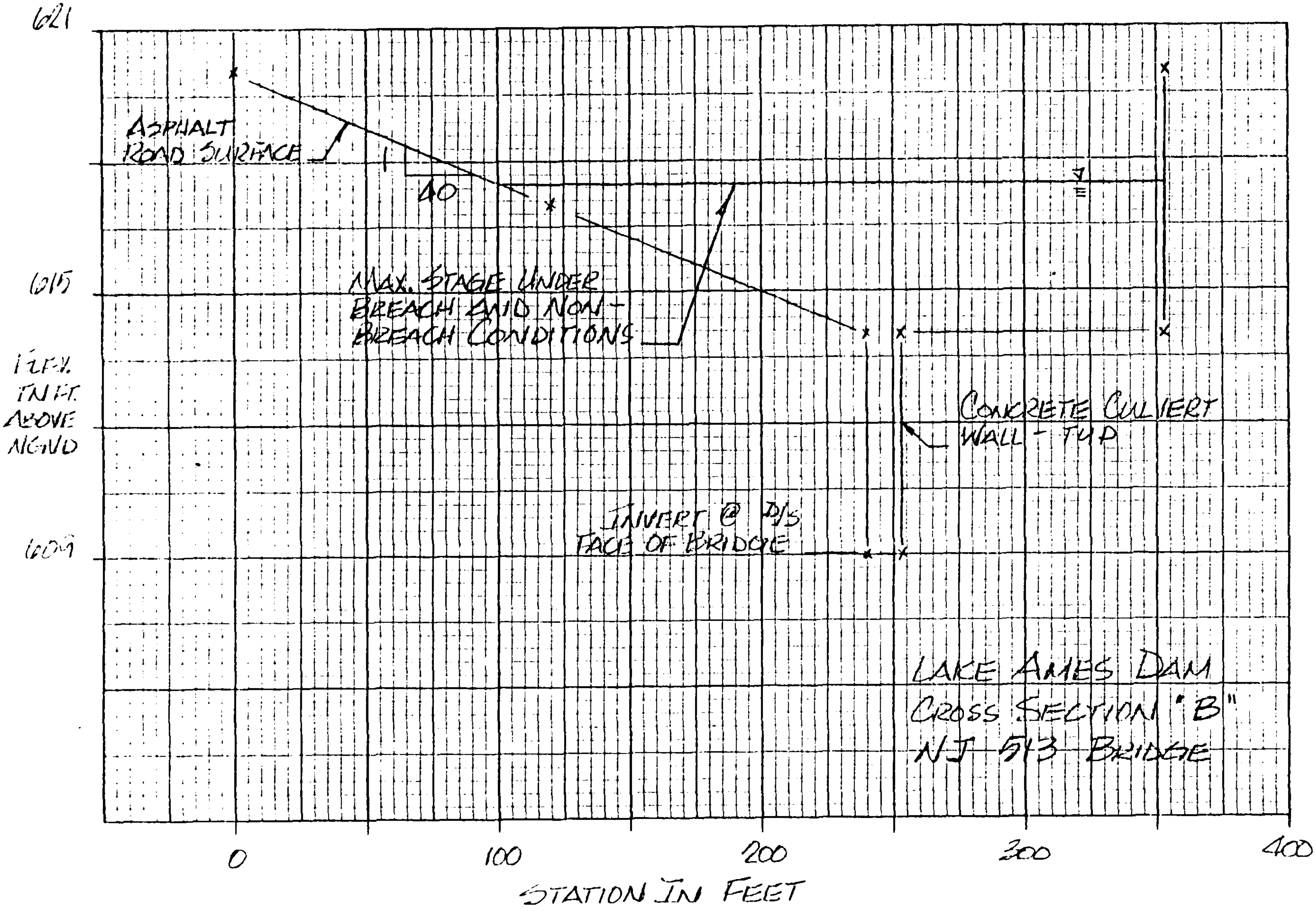
NO 31,282 10 DIVISIONS PER INCH BOTH WAYS. 90 BY 90 DIVISIONS. Codex IN STOCK DIRECT FROM CODEX BOOK CO., NORWOOD, MASS 02062



10116
Jan. 80
FDD

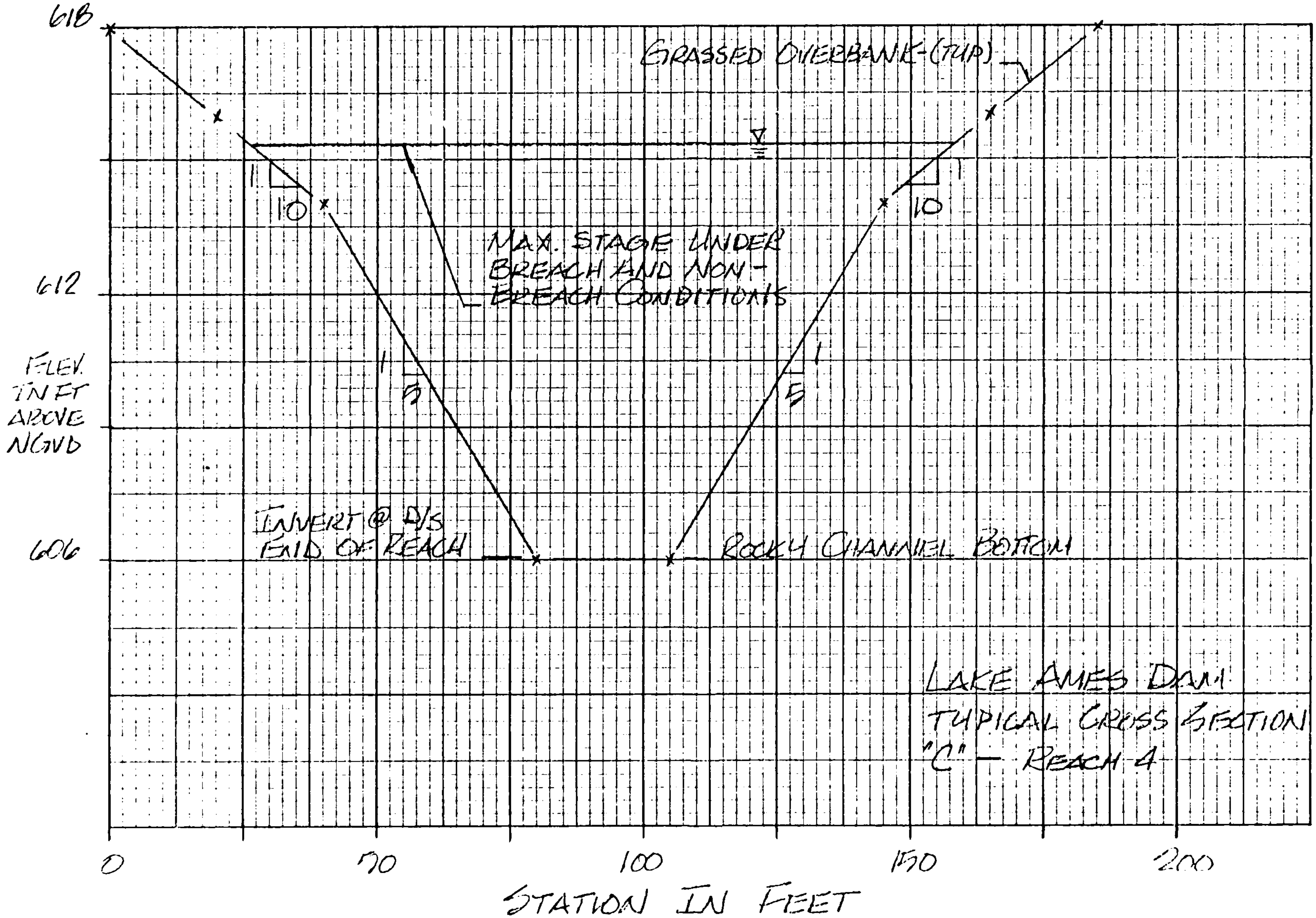

622
616
ELEV IN FT. ABOVE NGVD
610
MAXIMUM STAGE UNDER BREACH AND NON-BREACH CONDITIONS
1
20
1
20
WOODED OVERBANK (TYP-OTHER SIDE)
1
5
1
5
INVERT @ D/S END OF REACH
ROCKY CHANNEL BOTTOM
LAKE AMES DAM
TYPICAL CROSS SECTION
"A" - REACH 3
0
60
120
180
240
STATION IN FEET

NO. 31,282. 10 DIVISIONS PER INCH BOTH WAYS. 80 BY 90 DIVISIONS. CODEX IN STOCK DIRECT FROM CODEX BOOK CO., NORWOOD, MASS.

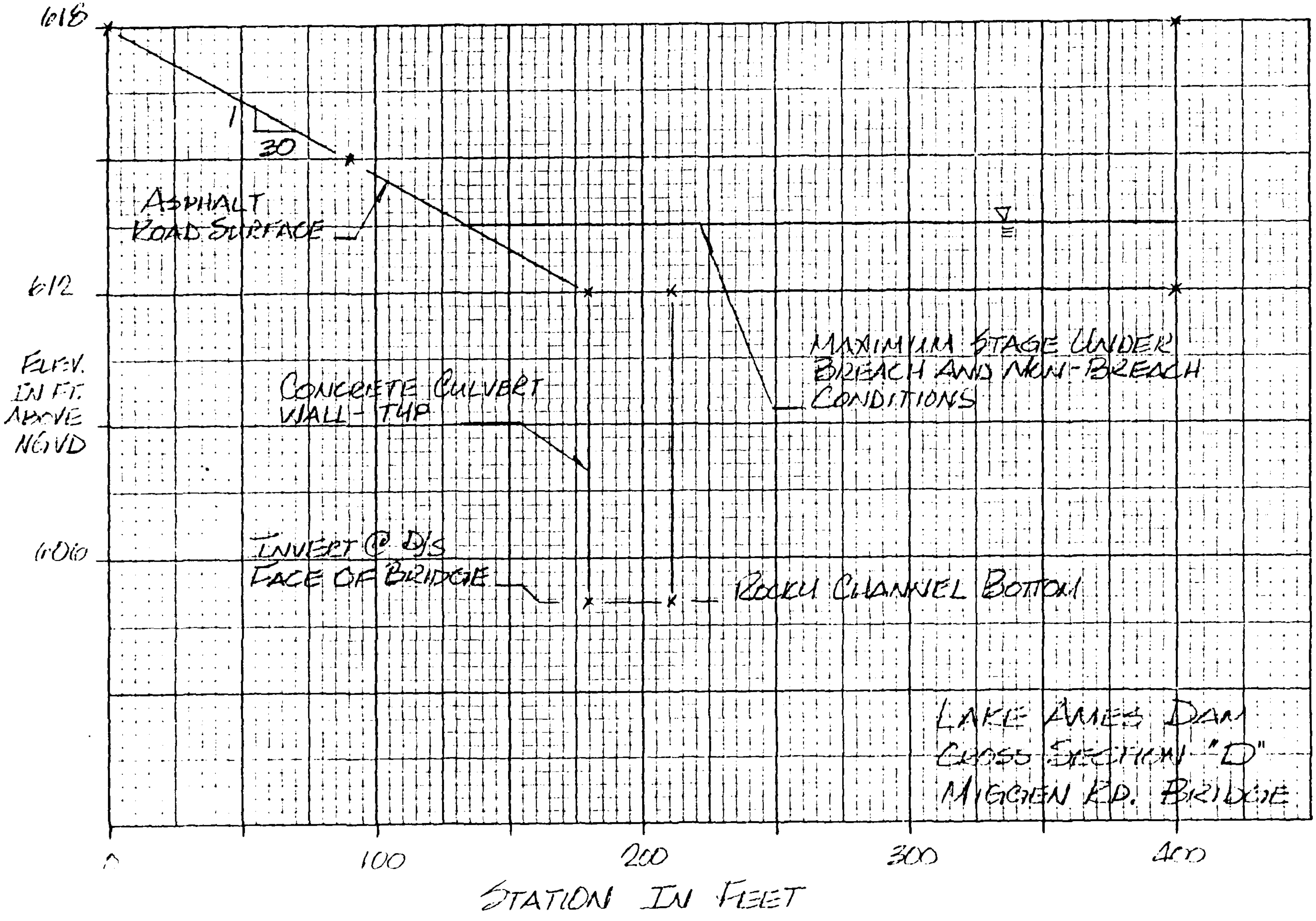


LAKE AMES DAM
CROSS SECTION "B"
NJ 513 BRIDGE

NO. 31,282. 10 DIVISIONS PER INCH BOTH WAYS. 60 BY 90 DIVISIONS. CODEX IN STOCK DIRECT FROM CODEX BOOK CO., NORWOOD, MASS. 02062

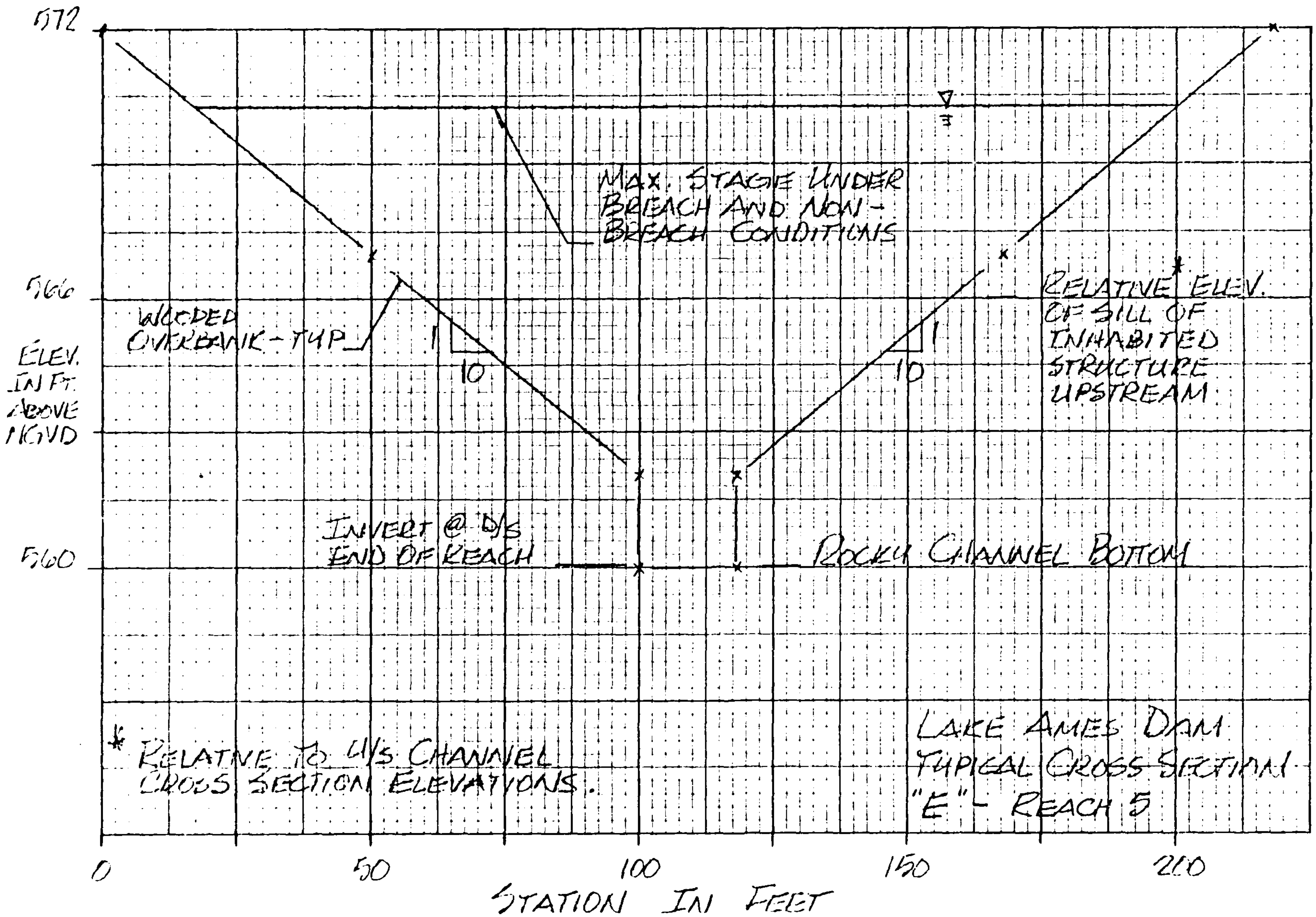


13/16
OFDD



LAKE AMES DAM
CROSS SECTION "D"
MIGGEN RD. BRIDGE

14/16


572
566
560
ELEV. IN FT. ABOVE NGVD
MAX. STAGE UNDER BREACH AND NON-BREACH CONDITIONS
WOODED OVERBANK - TYP.
1
10
1
10
RELATIVE ELEV. OF SILL OF INHABITED STRUCTURE UPSTREAM
INVERT @ D/S END OF REACH
ROCKY CHANNEL BOTTOM
* RELATIVE TO U/S CHANNEL CROSS SECTION ELEVATIONS.
LAKE AMES DAM
TYPICAL CROSS SECTION "E" - REACH 5
0
50
100
150
200
STATION IN FEET

15/16

Anderson-Nichols & Company, Inc.

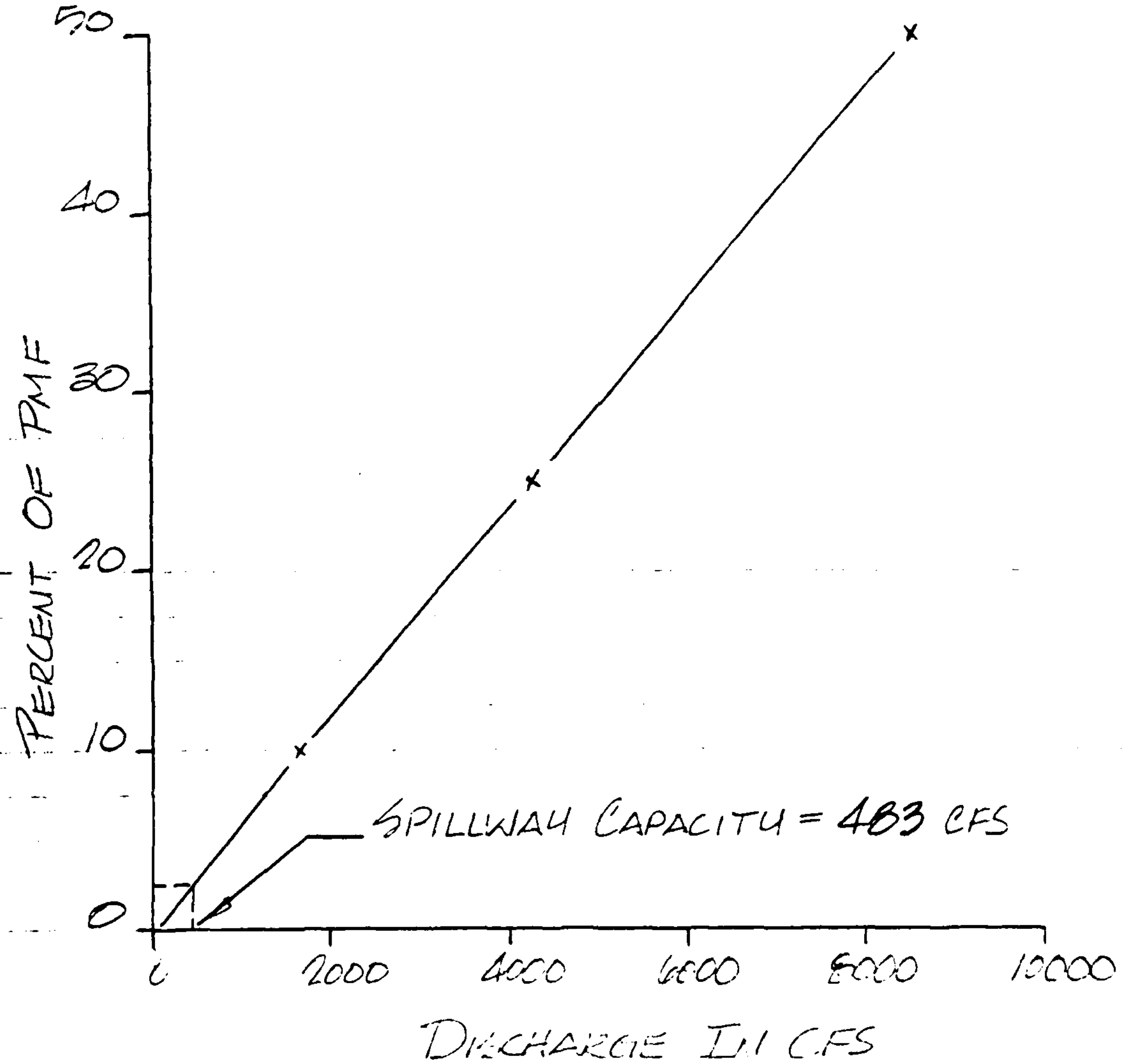
Subject LAKE AMES

JOB NO. 3409-03

Sheet No. 16 of 16
Date 3 Jan 80
Computed [illegible]
Checked FDD

SQUARES 1/4 IN SCALE

OVERTOPPING POTENTIAL



HEC-1 OUTPUT

OVERTOPPING ANALYSIS

LAKE AMES DAM

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*********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************
A1LAKE TELEMARK-LAKE AMES TANDEM DAM OVERTOPPING ANALYSES ** G.SHARRY A-M&CO **
A2NEW JERSEY DAM NOS.22-29&22-27 RESPCTVLY MORRIS COUNTY-TOWNSHIP OF ROCKAWAY
A3   0.5 MULTIPLE OF PMF FROM 24-HOUR PMP  -  BREACH ANALYSIS
B     200       0      10       0       0       0       0       0       0       0
B1      5
J       2       3       1
J1    0.1    0.25     0.5
K       0      A1                               1       1
K1 DEVELOP LAKE TELEMARK INFLOW HYDROGRAPH - SUB-AREA 1
M       1       2     2.5                     0.8                               1
P            22.7     113     123     132
T                                                       1     0.1
W2           1.61
X      -3
K       1      A2                               1       1
K1 ROUTE INFLOW HYDROGRAPH THROUGH LAKE TELEMARK
Y                               1       1
Y1      1                                              70      -1
Y4  669.0   671.1   673.2   674.0   674.5   675.0   675.5   676.0   677.0
Y5      0      21     239     946    1682    2592    3662    4885    7778
$S     18      60      70      82      92     106     130     160
$E  664.8   669.0   670.0   671.1   672.0   673.2   675.0   677.0
$$  669.0
$D  673.2
$B   16.8       0   664.8       1   670.0   673.2
$B   16.8       0   664.8       1   670.0   685.0
K       1      A3                               1       1
K1 CHANNEL ROUTING -MOD PULS- REACH 1
Y                               1       1
Y1      1                                              -1
Y6   0.05    0.05    0.05     663     674      50   0.012
Y7      0     674      32     670      64     666      64     663      84     663
Y7     84     666     116     670     148     674
K       1      A4                               1       1
K1 CHANNEL ROUTING -MOD PULS- TELEMARK ROAD BRIDGE
Y                               1       1
Y1      1                                              -1
Y6  0.016    0.04   0.016     662     672      30   0.012
Y7      0     672      40     670      80     668      80     662      94     662
Y7     94     668     114     670     134     672
K       1      A5                               1       1
K1 CHANNEL ROUTING -MOD PULS- REACH 2
Y                               1       1
Y1      1                                              -1
Y6   0.06    0.05    0.06     635     645    2300   0.012
Y7      0     645      80     641     160     637     160     635     172     635
Y7    172     637     212     641     252     645
K       0      A6                               1       1
K1 DEVELOP LAKE AMES INFLOW HYDROGRAPH - SUB-AREA 2
M       1       2     2.8                     0.8                               1
```

```
P           22.7     113     123     132
T                                                            1     0.1
V2          1.27
X     -3
K      2      A7                                     1       1
K1 COMBINE SUB-AREA 1 & SUB-AREA 2 FLOW CONTRIBUTIONS
K      1      A8                                     1       1
K1 ROUTE INFLOW HYDROGRAPH THROUGH LAKE AMES
Y                                    1       1
Y1     1                                                   155      -1
Y4 634.9   635.2   636.2   637.1   637.4   637.6   639.0   640.0   641.0
Y5     0      19     200     483     633     779    2621    4618    7140
$S    47     155     161     166     197     203     236     280
$E 628.4   634.9   635.2   635.5   637.1   637.4   639.0   641.0
$$ 634.7
$D 637.1
$B    26       1   628.4       1   634.9   637.1
$B    26       1   628.4       1   634.9   650.0
K      1      A9                                     1       1
K1 CHANNEL ROUTING -MOD PULS- REACH 3
Y                                    1       1
Y1     1                                                    -1
Y6  0.07    0.05    0.06     610     620    1100   0.016
Y7     0     620     100     615     115     612     115     610     135     610
Y7   135     612     150     615     250     620
K      1     A10                                     1       1
K1 CHANNEL ROUTING -MOD PULS- NJ 513 BRIDGE
Y                                    1       1
Y1     1                                                    -1
Y6  0.03    0.04    0.03     609     620      60   0.016
Y7     0     620     120     617     240     614     240     609     253     609
Y7   253     614     353     614     353     620
K      1     A11                                     1       1
K1 CHANNEL ROUTING -MOD PULS- REACH 4
Y                                    1       1
Y1     1                                                    -1
Y6  0.03    0.05    0.03     606     618     200   0.016
Y7     0     618      20     616      40     614      80     606     105     606
Y7   145     614     165     616     185     618
K      1     A12                                     1       1
K1 CHANNEL ROUTING -MOD PULS- MIGGEN RD BRIDGE
Y                                    1       1
Y1     1                                                    -1
Y6 0.016    0.04   0.016     605     618      37   0.016
Y7     0     618      90     615     180     612     180     605     211     605
Y7   211     612     400     612     400     618
K      1     A13                                     1       1
K1 CHANNEL ROUTING -MOD PULS- REACH 5
Y                                    1       1
Y1     1                                                    -1
```

8

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101     Y6  0.06    0.05    0.06     560     572    1200   0.016
102     Y7     0     572      50     567     100     562     100     560     118     560
103     Y7   118     562     168     567     218     572
104     K     99
```

4

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PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

     RUNOFF HYDROGRAPH AT              A1
     ROUTE HYDROGRAPH TO               A2
     ROUTE HYDROGRAPH TO               A3
     ROUTE HYDROGRAPH TO               A4
     ROUTE HYDROGRAPH TO               A5
     RUNOFF HYDROGRAPH AT              A6
     COMBINE  2 HYDROGRAPHS AT         A7
     ROUTE HYDROGRAPH TO               A8
     ROUTE HYDROGRAPH TO               A9
     ROUTE HYDROGRAPH TO              A10
     ROUTE HYDROGRAPH TO              A11
     ROUTE HYDROGRAPH TO              A12
     ROUTE HYDROGRAPH TO              A13
     END OF NETWORK
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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************

RUN  DATE* 79/12/31.
     TIME* 08.18.20.

              LAKE TELEMARK-LAKE AMES TANDEM DAM OVERTOPPING ANALYSES ## G.SHARRY A-N&CO ##
              NEW JERSEY DAM NOS.22-29&22-27 RESPCTVLY MORRIS COUNTY-TOWNSHIP OF ROCKAWAY
                 0.5 MULTIPLE OF PMF FROM 24-HOUR PMP  -  BREACH ANALYSIS

                                      JOB SPECIFICATION
               NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
              200       0      10       0       0       0       0       0       0       0
                                    JOPER     NWT   LROPT   TRACE
                                        5       0       0       0

                             MULTI-PLAN ANALYSES TO BE PERFORMED
                                NPLAN= 2 NRTIO= 3 LRTIO= 1
                RTIOS=     .10     .25     .50

          **********          **********          **********          **********          **********

                                  SUB-AREA RUNOFF COMPUTATION

             DEVELOP LAKE TELEMARK INFLOW HYDROGRAPH - SUB-AREA 1

                           ISTAQ   ICOMP    IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                              A1       0        0       0       0       1       1       0       0

                                          HYDROGRAPH DATA
              IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                  1       2    2.50    0.00    2.50     .80   0.000       0       1       0

                                             PRECIP DATA
                         SPFE     PMS      R6     R12     R24     R48     R72     R96
                         0.00   22.70  113.00  123.00  132.00    0.00    0.00    0.00

                                                LOSS DATA
           LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
               0    0.00    0.00    1.00    0.00    0.00    1.00    1.00     .10    0.00    0.00

                                         UNIT HYDROGRAPH DATA
                                   TC=  0.00     LAG=  1.61

                                             RECESSION DATA
                             STRTQ=   -3.00     QRCSN=    0.00     RTIOR= 1.00

             UNIT HYDROGRAPH 50 END OF PERIOD ORDINATES, TC=     0.00 HOURS, LAG=   1.61  VOL= 1.00
          21.        70.       132.       216.       326.       458.       572.       653.       700.       712.
         707.       671.       623.       569.       502.       421.       347.       292.       248.       211.
         182.       157.       134.       113.        96.        82.        70.        60.        51.        43.
          36.        31.        27.        23.        19.        17.        14.        12.        10.         9.
```

0 MO.DA	8. HR.MN	7. PERIOD	6. RAIN	5. EXCS	4. LOSS	END-OF-PERIOD FLOW COMP Q	3. MO.DA	3. HR.MN	2. PERIOD	1. RAIN	1. EXCS	LOSS	COMP Q
1.01	.10	1	.02	0.00	.02	8.	1.01	16.50	101	.48	.46	.02	7523.
1.01	.20	2	.02	0.00	.02	8.	1.01	17.00	102	.48	.46	.02	7762.
1.01	.30	3	.02	0.00	.02	8.	1.01	17.10	103	.38	.36	.02	7839.
1.01	.40	4	.02	0.00	.02	8.	1.01	17.20	104	.38	.36	.02	7801.
1.01	.50	5	.02	0.00	.02	8.	1.01	17.30	105	.38	.36	.02	7632.
1.01	1.00	6	.02	0.00	.02	8.	1.01	17.40	106	.38	.36	.02	7388.
1.01	1.10	7	.02	0.00	.02	8.	1.01	17.50	107	.38	.36	.02	7083.
1.01	1.20	8	.02	0.00	.02	8.	1.01	18.00	108	.38	.36	.02	6710.
1.01	1.30	9	.02	0.00	.02	8.	1.01	18.10	109	.03	.01	.02	6279.
1.01	1.40	10	.02	0.00	.02	8.	1.01	18.20	110	.03	.01	.02	5854.
1.01	1.50	11	.02	0.00	.02	8.	1.01	18.30	111	.03	.01	.02	5473.
1.01	2.00	12	.02	0.00	.02	8.	1.01	18.40	112	.03	.01	.02	5113.
1.01	2.10	13	.02	0.00	.02	8.	1.01	18.50	113	.03	.01	.02	4752.
1.01	2.20	14	.02	0.00	.02	8.	1.01	19.00	114	.03	.01	.02	4384.
1.01	2.30	15	.02	0.00	.02	8.	1.01	19.10	115	.03	.01	.02	3998.
1.01	2.40	16	.02	0.00	.02	8.	1.01	19.20	116	.03	.01	.02	3604.
1.01	2.50	17	.02	0.00	.02	8.	1.01	19.30	117	.03	.01	.02	3211.
1.01	3.00	18	.02	0.00	.02	8.	1.01	19.40	118	.03	.01	.02	2840.
1.01	3.10	19	.02	0.00	.02	8.	1.01	19.50	119	.03	.01	.02	2490.
1.01	3.20	20	.02	0.00	.02	8.	1.01	20.00	120	.03	.01	.02	2169.
1.01	3.30	21	.02	0.00	.02	8.	1.01	20.10	121	.03	.01	.02	1876.
1.01	3.40	22	.02	0.00	.02	8.	1.01	20.20	122	.03	.01	.02	1613.
1.01	3.50	23	.02	0.00	.02	8.	1.01	20.30	123	.03	.01	.02	1382.
1.01	4.00	24	.02	0.00	.02	8.	1.01	20.40	124	.03	.01	.02	1188.
1.01	4.10	25	.02	0.00	.02	8.	1.01	20.50	125	.03	.01	.02	1028.
1.01	4.20	26	.02	0.00	.02	8.	1.01	21.00	126	.03	.01	.02	892.
1.01	4.30	27	.02	0.00	.02	8.	1.01	21.10	127	.03	.01	.02	777.
1.01	4.40	28	.02	0.00	.02	8.	1.01	21.20	128	.03	.01	.02	679.
1.01	4.50	29	.02	0.00	.02	8.	1.01	21.30	129	.03	.01	.02	595.
1.01	5.00	30	.02	0.00	.02	8.	1.01	21.40	130	.03	.01	.02	522.
1.01	5.10	31	.02	0.00	.02	8.	1.01	21.50	131	.03	.01	.02	460.
1.01	5.20	32	.02	0.00	.02	8.	1.01	22.00	132	.03	.01	.02	407.
1.01	5.30	33	.02	0.00	.02	8.	1.01	22.10	133	.03	.01	.02	363.
1.01	5.40	34	.02	0.00	.02	8.	1.01	22.20	134	.03	.01	.02	325.
1.01	5.50	35	.02	0.00	.02	8.	1.01	22.30	135	.03	.01	.02	293.
1.01	6.00	36	.02	0.00	.02	8.	1.01	22.40	136	.03	.01	.02	266.
1.01	6.10	37	.05	0.00	.05	8.	1.01	22.50	137	.03	.01	.02	242.
1.01	6.20	38	.05	0.00	.05	8.	1.01	23.00	138	.03	.01	.02	221.
1.01	6.30	39	.05	0.00	.05	8.	1.01	23.10	139	.03	.01	.02	203.
1.01	6.40	40	.05	0.00	.05	8.	1.01	23.20	140	.03	.01	.02	188.
1.01	6.50	41	.05	0.00	.05	8.	1.01	23.30	141	.03	.01	.02	174.
1.01	7.00	42	.05	0.00	.05	8.	1.01	23.40	142	.03	.01	.02	161.
1.01	7.10	43	.05	.00	.05	8.	1.01	23.50	143	.03	.01	.02	151.
1.01	7.20	44	.05	.03	.02	9.	1.02	0.00	144	.03	.01	.02	142.
1.01	7.30	45	.05	.03	.02	11.	1.02	.10	145	0.00	0.00	0.00	136.
1.01	7.40	46	.05	.03	.02	16.	1.02	.20	146	0.00	0.00	0.00	131.
1.01	7.50	47	.05	.03	.02	24.	1.02	.30	147	0.00	0.00	0.00	125.
1.01	8.00	48	.05	.03	.02	35.	1.02	.40	148	0.00	0.00	0.00	119.
1.01	8.10	49	.05	.03	.02	51.	1.02	.50	149	0.00	0.00	0.00	113.
1.01	8.20	50	.05	.03	.02	71.	1.02	1.00	150	0.00	0.00	0.00	106.
1.01	8.30	51	.05	.03	.02	93.	1.02	1.10	151	0.00	0.00	0.00	98.
1.01	8.40	52	.05	.03	.02	117.	1.02	1.20	152	0.00	0.00	0.00	89.
1.01	8.50	53	.05	.03	.02	141.	1.02	1.30	153	0.00	0.00	0.00	80.
1.01	9.00	54	.05	.03	.02	165.	1.02	1.40	154	0.00	0.00	0.00	71.
1.01	9.10	55	.05	.03	.02	187.	1.02	1.50	155	0.00	0.00	0.00	63.

1.01	9.20	56	.05	.03	.02	208.	1.02	2.00	156	0.00	0.00	0.00	55.
1.01	9.30	57	.05	.03	.02	227.	1.02	2.10	157	0.00	0.00	0.00	48.
1.01	9.40	58	.05	.03	.02	244.	1.02	2.20	158	0.00	0.00	0.00	42.
1.01	9.50	59	.05	.03	.02	257.	1.02	2.30	159	0.00	0.00	0.00	37.
1.01	10.00	60	.05	.03	.02	269.	1.02	2.40	160	0.00	0.00	0.00	32.
1.01	10.10	61	.05	.03	.02	279.	1.02	2.50	161	0.00	0.00	0.00	28.
1.01	10.20	62	.05	.03	.02	287.	1.02	3.00	162	0.00	0.00	0.00	25.
1.01	10.30	63	.05	.03	.02	294.	1.02	3.10	163	0.00	0.00	0.00	23.
1.01	10.40	64	.05	.03	.02	300.	1.02	3.20	164	0.00	0.00	0.00	20.
1.01	10.50	65	.05	.03	.02	305.	1.02	3.30	165	0.00	0.00	0.00	19.
1.01	11.00	66	.05	.03	.02	309.	1.02	3.40	166	0.00	0.00	0.00	17.
1.01	11.10	67	.05	.03	.02	313.	1.02	3.50	167	0.00	0.00	0.00	15.
1.01	11.20	68	.05	.03	.02	316.	1.02	4.00	168	0.00	0.00	0.00	14.
1.01	11.30	69	.05	.03	.02	319.	1.02	4.10	169	0.00	0.00	0.00	13.
1.01	11.40	70	.05	.03	.02	321.	1.02	4.20	170	0.00	0.00	0.00	12.
1.01	11.50	71	.05	.03	.02	323.	1.02	4.30	171	0.00	0.00	0.00	12.
1.01	12.00	72	.05	.03	.02	325.	1.02	4.40	172	0.00	0.00	0.00	11.
1.01	12.10	73	.34	.33	.02	333.	1.02	4.50	173	0.00	0.00	0.00	10.
1.01	12.20	74	.34	.33	.02	354.	1.02	5.00	174	0.00	0.00	0.00	10.
1.01	12.30	75	.34	.33	.02	394.	1.02	5.10	175	0.00	0.00	0.00	10.
1.01	12.40	76	.34	.33	.02	458.	1.02	5.20	176	0.00	0.00	0.00	9.
1.01	12.50	77	.34	.33	.02	553.	1.02	5.30	177	0.00	0.00	0.00	9.
1.01	13.00	78	.34	.33	.02	687.	1.02	5.40	178	0.00	0.00	0.00	9.
1.01	13.10	79	.41	.39	.02	856.	1.02	5.50	179	0.00	0.00	0.00	9.
1.01	13.20	80	.41	.39	.02	1052.	1.02	6.00	180	0.00	0.00	0.00	8.
1.01	13.30	81	.41	.39	.02	1265.	1.02	6.10	181	0.00	0.00	0.00	8.
1.01	13.40	82	.41	.39	.02	1488.	1.02	6.20	182	0.00	0.00	0.00	8.
1.01	13.50	83	.41	.39	.02	1717.	1.02	6.30	183	0.00	0.00	0.00	8.
1.01	14.00	84	.41	.39	.02	1944.	1.02	6.40	184	0.00	0.00	0.00	8.
1.01	14.10	85	.51	.50	.02	2167.	1.02	6.50	185	0.00	0.00	0.00	8.
1.01	14.20	86	.51	.50	.02	2385.	1.02	7.00	186	0.00	0.00	0.00	8.
1.01	14.30	87	.51	.50	.02	2593.	1.02	7.10	187	0.00	0.00	0.00	8.
1.01	14.40	88	.51	.50	.02	2787.	1.02	7.20	188	0.00	0.00	0.00	8.
1.01	14.50	89	.51	.50	.02	2970.	1.02	7.30	189	0.00	0.00	0.00	8.
1.01	15.00	90	.51	.50	.02	3148.	1.02	7.40	190	0.00	0.00	0.00	8.
1.01	15.10	91	.47	.45	.02	3321.	1.02	7.50	191	0.00	0.00	0.00	8.
1.01	15.20	92	.78	.76	.02	3492.	1.02	8.00	192	0.00	0.00	0.00	8.
1.01	15.30	93	1.40	1.39	.02	3680.	1.02	8.10	193	0.00	0.00	0.00	8.
1.01	15.40	94	3.51	3.49	.02	3947.	1.02	8.20	194	0.00	0.00	0.00	8.
1.01	15.50	95	1.01	1.00	.02	4311.	1.02	8.30	195	0.00	0.00	0.00	8.
1.01	16.00	96	.62	.61	.02	4745.	1.02	8.40	196	0.00	0.00	0.00	8.
1.01	16.10	97	.48	.46	.02	5268.	1.02	8.50	197	0.00	0.00	0.00	8.
1.01	16.20	98	.48	.46	.02	5886.	1.02	9.00	198	0.00	0.00	0.00	8.
1.01	16.30	99	.48	.46	.02	6546.	1.02	9.10	199	0.00	0.00	0.00	8.
1.01	16.40	100	.48	.46	.02	7115.	1.02	9.20	200	0.00	0.00	0.00	8.

SUM 23.97 21.29 2.69 207463.
(609.)(541.)(68.)(5874.70)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	7839.	4830.	1438.	1037.	207431.
CMS	222.	137.	41.	29.	5874.
INCHES		18.00	21.40	21.44	21.44
MM		457.21	543.49	544.57	544.57
AC-FT		2399.	2851.	2857.	2857.
THOUS CU M		2959.	3517.	3524.	3524.

HYDROGRAPH AT STA A1 FOR PLAN 1, RTIO 3

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	6.	8.	12.	18.	26.	36.
47.	53.	71.	82.	94.	104.	113.	122.	129.	134.
139.	143.	147.	150.	153.	155.	157.	158.	160.	161.
162.	163.	166.	177.	197.	229.	277.	344.	428.	526.
633.	744.	858.	972.	1084.	1193.	1297.	1393.	1485.	1574.
1660.	1746.	1840.	1973.	2156.	2373.	2634.	2943.	3273.	3557.
3762.	3881.	3920.	3900.	3816.	3694.	3542.	3355.	3139.	2927.
2730.	2556.	2376.	2192.	1999.	1802.	1606.	1420.	1245.	1084.
930.	806.	691.	594.	514.	446.	389.	340.	297.	261.
230.	204.	181.	163.	147.	133.	121.	111.	102.	94.
87.	81.	75.	71.	68.	65.	63.	60.	57.	53.
49.	44.	40.	36.	31.	28.	24.	21.	18.	16.
14.	13.	11.	10.	9.	8.	8.	7.	7.	6.
6.	5.	5.	5.	5.	5.	5.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3920.	2419.	719.	519.	103715.
CMS	111.	68.	20.	15.	2937.
INCHES		9.00	10.70	10.72	10.72
MM		228.60	271.74	272.29	272.29
AC-FT		1199.	1426.	1429.	1429.
THOUS CU M		1479.	1759.	1762.	1762.

PLAN 2 SAME AS PLAN 1

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

ROUTE INFLOW HYDROGRAPH THROUGH LAKE TELEMARK

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A2	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	70.	-1

STAGE	667.00	671.10	673.20	674.00	674.50	675.00	675.50	676.00	677.00
FLOW	0.00	21.00	239.00	946.00	1682.00	2592.00	3662.00	4885.00	7770.00

CAPACITY=	18.	60.	70.	82.	92.	100.	130.	160.

10

ELEVATION=	665.	669.	670.	671.	672.	673.	675.	677.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
669.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
673.2	0.0	0.0	0.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
17.	0.00	664.80	1.00	670.00	673.20

•CVN•

STATION A2, PLAN 1, RATIO 3

BEGIN DAM FAILURE AT 13.50 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

				OUTFLOW					
10.	10.	10.	10.	10.	10.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
8.	9.	10.	10.	11.	13.	14.	15.	16.	18.
19.	21.	35.	49.	61.	72.	82.	92.	100.	107.
113.	119.	124.	130.	136.	145.	158.	175.	200.	232.
420.	665.	868.	1038.	1190.	1330.	1485.	1442.	1441.	1470.
1541.	1659.	1757.	1866.	2011.	2196.	2430.	2766.	3087.	3410.
3667.	3826.	3902.	3910.	3857.	3752.	3613.	3443.	3241.	3046.
2845.	2659.	2478.	2317.	2155.	1969.	1775.	1584.	1455.	1362.
1250.	1131.	1009.	893.	801.	729.	661.	596.	535.	480.
431.	390.	353.	320.	291.	265.	242.	222.	203.	187.
173.	160.	148.	138.	128.	120.	113.	106.	100.	94.
89.	84.	79.	74.	70.	65.	61.	57.	53.	49.
46.	43.	40.	37.	35.	33.	30.	28.	27.	25.
23.	22.	21.	20.	19.	18.	17.	16.	15.	14.
14.	13.	12.	12.	11.	11.	10.	10.	10.	9.
9.	9.	8.	8.	8.	8.	7.	7.	7.	7.
				STORAGE					
70.	70.	70.	70.	70.	70.	69.	69.	69.	69.
69.	69.	69.	69.	69.	69.	69.	69.	69.	69.
68.	68.	68.	68.	68.	68.	68.	68.	68.	68.
68.	68.	68.	68.	68.	68.	68.	67.	67.	67.
67.	67.	67.	67.	67.	67.	67.	67.	67.	68.
68.	69.	70.	71.	72.	73.	74.	76.	77.	79.
80.	82.	84.	85.	86.	88.	89.	90.	90.	91.
92.	93.	93.	94.	94.	95.	97.	99.	102.	105.
109.	111.	111.	111.	109.	108.	106.	104.	104.	105.
107.	108.	109.	110.	112.	114.	117.	120.	122.	124.
126.	127.	128.	128.	127.	127.	126.	125.	123.	122.
120.	119.	117.	116.	114.	112.	109.	107.	104.	101.
97.	93.	88.	84.	80.	76.	72.	69.	65.	62.
59.	56.	54.	52.	50.	48.	46.	44.	43.	42.
40.	39.	38.	37.	36.	36.	35.	34.	34.	33.
32.	32.	31.	31.	30.	30.	29.	29.	28.	28.
27.	27.	26.	26.	26.	25.	25.	25.	24.	24.
24.	24.	23.	23.	23.	23.	23.	23.	22.	22.
22.	22.	22.	22.	22.	22.	21.	21.	21.	21.
21.	21.	21.	21.	21.	21.	21.	21.	21.	21.
				STAGE					
670.0	670.0	670.0	670.0	670.0	670.0	669.9	669.9	669.9	669.9
669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9
669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8
669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.7	669.7	669.7
669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.8
669.8	669.9	670.0	670.0	670.1	670.3	670.4	670.5	670.6	670.8
671.0	671.1	671.2	671.4	671.5	671.6	671.7	671.8	671.9	671.9

	[illegible]	672.1	672.1	672.2	672.3	672.4	672.6	672.8	673.1
	[illegible]	673.6	673.5	673.4	673.3	673.2	673.0	673.0	673.1
	[illegible]	673.4	673.5	673.7	673.8	674.0	674.2	674.4	674.6
[illegible]	674.8	674.8	674.8	674.8	574.7	674.7	674.6	674.5	674.4
[illegible]	674.2	674.1	673.9	673.8	673.6	673.4	673.3	673.1	672.8
[illegible]	672.1	671.7	671.3	670.9	670.6	670.2	669.9	669.5	669.2
[illegible]	668.6	668.4	668.2	668.0	667.8	667.6	667.4	667.3	667.2
[illegible]	666.9	666.8	666.7	666.6	666.6	666.5	666.4	666.4	666.3
[illegible]	666.2	666.1	666.1	666.0	666.0	665.9	665.9	665.8	665.8
665.7	665.7	665.6	665.6	665.6	665.5	665.5	665.5	665.4	665.4
665.4	665.4	665.3	665.3	665.3	665.3	665.3	665.3	665.2	665.2
665.2	665.2	665.2	665.2	665.2	665.2	665.1	665.1	665.1	665.1
665.1	665.1	665.1	665.1	665.1	665.1	665.1	665.1	665.1	665.1

PEAK OUTFLOW IS 3910. AT TIME 17.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3910.	2444.	742.	537.	107302.
CMS	111.	69.	21.	15.	3038.
INCHES		9.09	11.04	11.09	11.09
MM		230.94	280.52	281.70	281.70
AC-FT		1212.	1472.	1478.	1478.
THOUS CU M		1495.	1815.	1823.	1823.

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THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

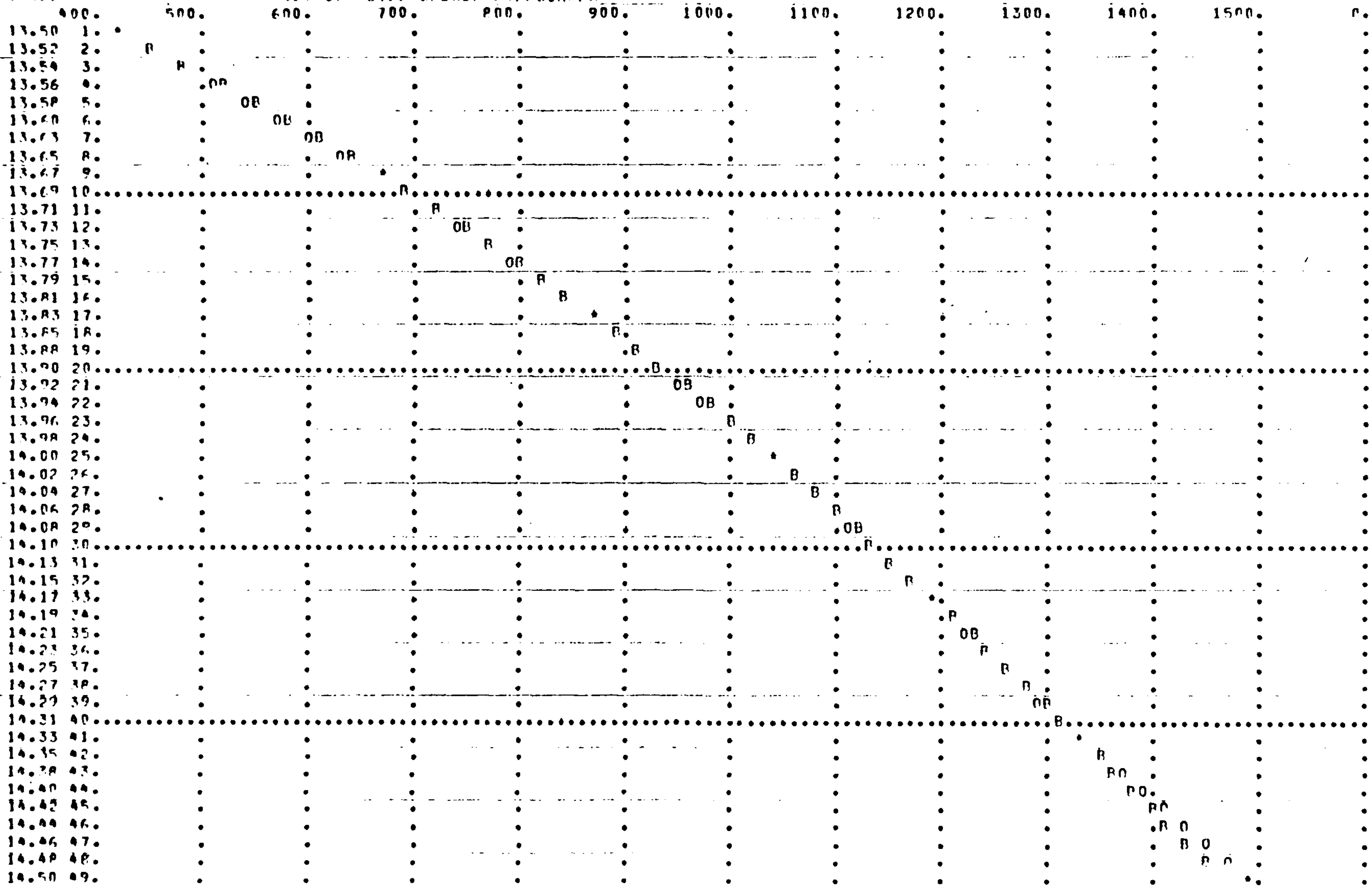
TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
13.500	0.000	420.		420.		0.	0.	0.
13.521	.021	451.		452.		-1.	-1.	-0.
13.542	.042	482.		484.		-3.	-4.	-0.
13.563	.063	512.		516.		-4.	-7.	-0.
13.583	.083	543.		547.		-4.	-12.	-0.
13.604	.104	573.		578.		-4.	-16.	-0.
13.625	.125	604.		608.		-4.	-20.	-0.
13.646	.146	635.		637.		-2.	-22.	-0.
13.667	.167	665.		665.		-0.	-22.	-0.
13.688	.188	691.		693.		-2.	-25.	-0.
13.708	.208	716.		720.		-4.	-29.	-0.
13.729	.229	741.		746.		-5.	-33.	-0.
13.750	.250	767.		772.		-5.	-38.	-0.
13.771	.271	792.		797.		-5.	-43.	-0.
13.792	.292	817.		821.		-4.	-47.	-0.
13.813	.313	843.		845.		-2.	-49.	-0.
13.833	.333	868.		868.		0.	-49.	-0.
13.854	.354	889.		891.		-1.	-50.	-0.
13.875	.375	910.		913.		-2.	-52.	-0.
13.896	.396	932.		935.		-3.	-55.	-0.
13.917	.417	953.		956.		-3.	-58.	-0.
13.938	.438	974.		977.		-3.	-61.	-0.
13.958	.458	996.		998.		-2.	-63.	-0.
13.979	.479	1017.		1018.		-1.	-64.	-0.
14.000	.500	1038.		1038.		-0.	-64.	-0.
14.021	.521	1057.		1058.		-1.	-65.	-0.
14.042	.542	1076.		1078.		-1.	-67.	-0.
14.063	.563	1095.		1097.		-2.	-68.	-0.
14.083	.583	1114.		1116.		-2.	-70.	-0.
14.104	.604	1133.		1135.		-2.	-72.	-0.
14.125	.625	1152.		1153.		-1.	-73.	-0.
14.146	.646	1171.		1172.		-1.	-74.	-0.
14.167	.667	1190.		1190.		0.	-74.	-0.
14.188	.688	1207.		1208.		-1.	-74.	-0.
14.208	.708	1225.		1226.		-1.	-75.	-0.
14.229	.729	1242.		1244.		-1.	-77.	-0.
14.250	.750	1260.		1261.		-1.	-78.	-0.
14.271	.771	1277.		1278.		-1.	-79.	-0.
14.292	.792	1295.		1296.		-1.	-80.	-0.
14.313	.812	1312.		1313.		-0.	-80.	-0.
14.333	.833	1330.		1330.		0.	-80.	-0.
14.354	.854	1349.		1347.		3.	-78.	-0.
14.375	.875	1369.		1363.		5.	-72.	-0.
14.396	.896	1388.		1380.		8.	-64.	-0.
14.417	.917	1407.		1396.		11.	-53.	-0.
14.438	.937	1427.		1412.		14.	-38.	-0.
14.458	.958	1446.		1428.		18.	-20.	-0.
14.479	.979	1466.		1454.		11.	-9.	-0.
14.500	1.000	1485.		1485.		0.	-9.	-0.

OVF

STATION A2

(O) INTERPOLATED BREACH HYDROGRAPH
(B) COMPUTED BREACH HYDROGRAPH

(*) POINTS AT NORMAL TIME INTERVAL



STATION A2, PLAN 2, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

10.	10.	10.	10.	10.	10.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.

8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	9.	10.	10.	11.	13.	14.	15.	16.	18.
19.	21.	35.	49.	61.	72.	82.	92.	100.	107.
113.	119.	124.	130.	136.	145.	158.	175.	200.	232.
417.	587.	721.	843.	964.	1114.	1227.	1329.	1424.	1515.
1603.	1691.	1789.	1902.	2060.	2258.	2496.	2784.	3105.	3413.
3657.	3830.	3904.	3910.	3855.	3749.	3614.	3450.	3249.	3035.
2834.	2649.	2471.	2290.	2102.	1907.	1710.	1536.	1360.	1191.
1036.	908.	808.	704.	610.	529.	459.	399.	349.	305.
268.	239.	233.	226.	218.	209.	199.	190.	180.	171.
161.	152.	144.	136.	128.	121.	114.	108.	102.	96.
91.	85.	80.	75.	70.	65.	60.	56.	51.	47.
43.	40.	36.	33.	30.	28.	25.	23.	21.	21.
21.	20.	20.	20.	20.	20.	20.	19.	19.	19.
19.	19.	18.	18.	18.	18.	18.	18.	17.	17.
17.	17.	17.	17.	16.	16.	16.	16.	16.	16.

STORAGE

70.	70.	70.	70.	70.	70.	69.	69.	69.	69.
69.	69.	69.	69.	69.	69.	69.	69.	69.	69.
68.	68.	68.	68.	68.	68.	68.	68.	68.	68.
68.	68.	68.	68.	68.	68.	68.	67.	67.	67.
67.	67.	67.	67.	67.	67.	67.	67.	67.	68.
68.	69.	70.	71.	72.	73.	74.	76.	77.	79.
80.	82.	84.	85.	86.	88.	89.	90.	90.	91.
92.	93.	93.	94.	94.	95.	97.	99.	102.	105.
109.	111.	113.	115.	117.	118.	119.	120.	121.	122.
123.	123.	124.	125.	126.	128.	129.	131.	134.	136.
137.	139.	139.	139.	139.	138.	137.	136.	135.	133.
132.	130.	129.	128.	126.	125.	124.	122.	120.	119.
117.	116.	115.	113.	112.	110.	109.	108.	108.	107.
106.	106.	105.	105.	104.	103.	102.	100.	99.	98.
97.	96.	95.	94.	94.	93.	92.	91.	91.	90.
89.	89.	88.	88.	87.	87.	86.	86.	85.	85.
84.	84.	84.	83.	83.	83.	82.	82.	82.	82.
82.	81.	81.	81.	81.	81.	80.	80.	80.	80.
80.	79.	79.	79.	79.	79.	78.	78.	78.	78.
78.	77.	77.	77.	77.	77.	77.	76.	76.	76.

STAGE

670.0	670.0	670.0	670.0	670.0	670.0	669.9	669.9	669.9	669.9
669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9	669.9
669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.8
669.8	669.8	669.8	669.8	669.8	669.8	669.8	669.7	669.7	669.7
669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.7	669.8
669.8	669.9	670.0	670.0	670.1	670.3	670.4	670.5	670.6	670.8
670.9	671.1	671.2	671.4	671.5	671.6	671.7	671.8	671.9	671.9
672.0	672.0	672.1	672.1	672.2	672.3	672.4	672.6	672.8	673.1
673.4	673.6	673.7	673.9	674.0	674.1	674.2	674.3	674.3	674.4
674.4	674.5	674.6	674.6	674.7	674.8	674.9	675.1	675.2	675.4
675.5	675.6	675.6	675.6	675.6	675.5	675.5	675.4	675.3	675.2
675.1	675.0	674.7	674.8	674.7	674.6	674.5	674.4	674.3	674.2
674.1	674.0	673.8	673.7	673.6	673.5	673.4	673.4	673.3	673.3
673.2	673.2	673.1	673.1	673.0	672.9	672.8	672.7	672.6	672.5
672.5	672.4	672.3	672.2	672.1	672.1	672.0	671.9	671.9	671.8
671.8	671.7	671.7	671.6	671.6	671.5	671.5	671.4	671.4	671.4
671.3	671.3	671.2	671.2	671.2	671.2	671.1	671.1	671.1	671.1
671.1	671.0	671.0	671.0	671.0	671.0	671.0	670.9	670.9	670.9
670.9	670.9	670.8	670.8	670.8	670.8	670.8	670.8	670.7	670.7

670.7 670.7 670.7 670.7 670.6 670.6 670.6 670.6 670.6 670.6

PEAK OUTFLOW IS 3910. AT TIME 17.33 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3910.	2417.	714.	516.	103270.
CMS	111.	68.	20.	15.	2924.
INCHES		8.99	10.63	10.67	10.67
MM		228.44	269.90	271.12	271.12
AC-FT		1199.	1416.	1422.	1422.
THOUS CU M		1478.	1747.	1755.	1755.

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 1

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A3	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0500	.0500	.0500	663.0	674.0	50.	.01200

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 674.00 32.00 670.00 64.00 666.00 64.00 663.00 84.00 663.00
84.00 666.00 116.00 670.00 148.00 674.00

STORAGE	0.00	.01	.03	.04	.05	.07	.08	.10	.13	.16
	.20	.25	.30	.36	.43	.50	.57	.66	.74	.84
OUTFLOW	0.00	25.29	77.49	147.25	230.34	324.02	438.94	583.40	765.76	994.09
	1275.51	1616.59	2023.43	2501.86	3057.39	3695.36	4420.91	5239.00	6154.49	7172.07
STAGE	663.00	663.58	664.16	664.74	665.32	665.89	666.47	667.05	667.63	668.21
	668.79	669.37	669.95	670.53	671.11	671.68	672.26	672.84	673.42	674.00
FLOW	0.00	25.29	77.49	147.25	230.34	324.02	438.94	583.40	765.76	994.09
	1275.51	1616.59	2023.43	2501.86	3057.39	3695.36	4420.91	5239.00	6154.49	7172.07

26

STATION A3, PLAN 1, RTIO 3

OUTFLOW

10.	10.	10.	10.	10.	10.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	9.	10.	10.	11.	13.	14.	15.	16.	18.
19.	21.	35.	49.	61.	72.	82.	92.	99.	107.
113.	119.	124.	130.	136.	145.	157.	175.	199.	231.
417.	664.	865.	1037.	1168.	1329.	1483.	1445.	1438.	1472.
1538.	1660.	1754.	1867.	2008.	2196.	2426.	2764.	3083.	3400.

3665.	3826.	3900.	3911.	3857.	3753.	3614.	3445.	3242.	3048.
2846.	2661.	2480.	2318.	2156.	1971.	1777.	1586.	1456.	1363.
1251.	1133.	1010.	894.	801.	730.	662.	597.	535.	480.
431.	390.	353.	321.	291.	266.	242.	222.	204.	187.
173.	160.	148.	138.	128.	120.	113.	106.	100.	95.
89.	84.	79.	75.	70.	65.	61.	57.	53.	50.
46.	43.	40.	37.	35.	33.	30.	28.	27.	25.
24.	22.	21.	20.	19.	18.	17.	16.	15.	14.
14.	13.	12.	12.	11.	11.	10.	10.	10.	9.
9.	9.	8.	8.	8.	8.	7.	7.	7.	7.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.3	663.3	663.3	663.3	663.4	663.4
663.4	663.5	663.7	663.8	664.0	664.1	664.2	664.3	664.3	664.4
664.5	664.5	664.5	664.6	664.6	664.7	664.8	664.9	665.1	665.3
666.4	667.3	667.9	668.3	668.6	668.9	669.1	669.1	669.1	669.1
669.2	669.4	669.6	669.7	669.9	670.2	670.4	670.8	671.1	671.4
671.7	671.8	671.8	671.9	671.8	671.7	671.6	671.5	671.3	671.1
670.9	670.7	670.5	670.3	670.1	669.9	669.6	669.3	669.1	668.9
668.7	668.5	668.2	668.0	667.7	667.5	667.3	667.1	666.9	666.6
666.4	666.2	666.0	665.9	665.7	665.5	665.4	665.3	665.1	665.0
664.9	664.8	664.7	664.7	664.6	664.5	664.5	664.4	664.3	664.3
664.3	664.2	664.2	664.1	664.1	664.0	664.0	663.9	663.9	663.8
663.8	663.8	663.7	663.7	663.7	663.7	663.6	663.6	663.6	663.6
663.5	663.5	663.5	663.5	663.4	663.4	663.4	663.4	663.3	663.3
663.3	663.3	663.3	663.3	663.3	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3911.	2494.	792.	537.	107302.
CMS	111.	69.	21.	15.	3038.
INCHES		9.09	11.04	11.09	11.09
MM		230.94	280.52	281.70	281.70

31

AC-FT	1212.	1472.	1478.	1478.
THOUS CU M	1495.	1815.	1823.	1823.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 671.9

STATION A3, PLAN 2, RTIO 3

OUTFLOW

10.	10.	10.	10.	10.	10.	9.	9.	9.	9.

34 ✓

9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	9.	10.	10.	11.	13.	14.	15.	16.	18.
19.	21.	35.	49.	61.	72.	82.	92.	99.	107.
113.	119.	124.	130.	136.	145.	157.	175.	199.	231.
414.	587.	719.	843.	962.	1113.	1225.	1328.	1423.	1515.
1602.	1690.	1788.	1902.	2057.	2257.	2493.	2782.	3102.	3411.
3655.	3830.	3903.	3911.	3856.	3751.	3615.	3452.	3250.	3037.
2835.	2650.	2472.	2292.	2103.	1909.	1711.	1538.	1362.	1193.
1037.	910.	809.	706.	611.	530.	459.	400.	349.	306.
268.	239.	233.	227.	218.	209.	199.	190.	180.	171.
161.	153.	144.	136.	128.	121.	114.	108.	102.	96.
91.	86.	80.	75.	70.	65.	60.	56.	51.	47.
43.	40.	36.	33.	30.	28.	25.	23.	21.	21.
21.	20.	20.	20.	20.	20.	20.	19.	19.	19.
19.	19.	18.	18.	18.	18.	18.	18.	17.	17.
17.	17.	17.	17.	16.	16.	16.	16.	16.	16.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2	663.2
663.2	663.2	663.2	663.2	663.3	663.3	663.3	663.3	663.4	663.4
663.4	663.5	663.7	663.8	664.0	664.1	664.2	664.3	664.3	664.4
664.5	664.5	664.5	664.6	664.6	664.7	664.8	664.9	665.1	665.3
666.3	667.1	667.5	667.8	668.1	668.5	668.7	668.9	669.0	669.2
669.3	669.5	669.6	669.8	670.0	670.2	670.5	670.8	671.1	671.4
671.6	671.8	671.9	671.9	671.8	671.7	671.6	671.5	671.3	671.1
670.9	670.7	670.5	670.3	670.0	669.8	669.5	669.2	668.9	668.6
668.3	668.0	667.7	667.4	667.1	666.8	666.6	666.3	666.0	665.8
665.5	665.4	665.3	665.3	665.2	665.2	665.1	665.0	665.0	664.9
664.8	664.8	664.7	664.6	664.6	664.5	664.5	664.4	664.4	664.3
664.3	664.2	664.2	664.1	664.1	664.0	664.0	663.9	663.9	663.8
663.8	663.7	663.7	663.7	663.6	663.6	663.6	663.5	663.5	663.5

35 ✓

663.5	663.5	663.5	663.5	663.5	663.5	663.4	663.4	663.4	663.4
663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4
663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4	663.4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3911.	2417.	714.	516.	103270.
CMS	111.	68.	20.	15.	2924.
INCHES		8.99	10.63	10.67	10.67
MM		228.43	269.90	271.12	271.12
AC-FT		1199.	1416.	1422.	1422.
THOUS CU M		1478.	1747.	1755.	1755.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 671.9

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- TELEMARK ROAD BRIDGE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A4	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0160	.0400	.0160	662.0	672.0	30.	.01200

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	672.00	40.00	670.00	80.00	668.00	80.00	662.00	94.00	662.00
94.00	668.00	114.00	670.00	134.00	672.00				

STORAGE	0.00	.01	.01	.02	.02	.03	.03	.04	.04	.05
	.05	.06	.06	.07	.09	.11	.14	.18	.22	.26
OUTFLOW	0.00	10.68	56.68	106.80	165.79	231.64	302.95	378.72	458.20	540.78
	626.02	713.52	820.40	993.25	1277.09	1712.54	2335.00	3176.62	4267.26	5635.04
STAGE	662.00	662.53	663.05	663.58	664.11	664.63	665.16	665.68	666.21	666.74

36

	667.26	667.79	668.32	668.84	669.37	669.89	670.42	670.95	671.47	672.00
FLOW	0.00	10.68	50.68	106.80	165.79	231.64	302.95	378.72	458.20	540.70
	626.02	713.52	820.40	993.25	1277.09	1712.54	2335.00	3176.62	4267.26	5635.04

STATION A4, PLAN 1, RTIO 3

OUTFLOW

10.	10.	10.	10.	10.	10.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	9.	10.	10.	11.	12.	14.	15.	16.	18.

39 ✓

19.	21.	34.	47.	61.	72.	82.	92.	99.	107.
113.	119.	124.	130.	136.	145.	157.	175.	199.	231.
415.	663.	864.	1037.	1187.	1329.	1482.	1446.	1437.	1473.
1536.	1660.	1753.	1867.	2007.	2196.	2425.	2764.	3082.	3408.
3644.	3826.	3900.	3911.	3857.	3754.	3614.	3446.	3243.	3049.
2847.	2661.	2480.	2319.	2157.	1972.	1777.	1587.	1456.	1363.
1251.	1133.	1010.	895.	802.	731.	662.	598.	535.	481.
437.	391.	353.	321.	291.	266.	242.	222.	204.	188.
173.	160.	148.	138.	128.	120.	113.	106.	100.	95.
99.	84.	79.	75.	70.	65.	61.	57.	53.	50.
46.	43.	40.	37.	35.	33.	30.	28.	27.	25.
24.	22.	21.	20.	19.	18.	17.	16.	15.	14.
14.	13.	12.	12.	11.	11.	10.	10.	10.	9.
9.	9.	8.	8.	8.	8.	7.	7.	7.	7.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3
662.3	662.3	662.3	662.3	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.3	662.3	662.3	662.4	662.4	662.4	662.5	662.5
662.5	662.6	662.7	662.9	663.1	663.2	663.3	663.4	663.5	663.6
663.6	663.7	663.7	663.8	663.8	663.9	664.0	664.2	664.4	664.6
665.9	667.5	668.4	668.9	669.2	669.4	669.6	669.6	669.6	669.6
669.7	669.8	669.9	670.0	670.1	670.3	670.5	670.7	670.9	671.1
671.2	671.3	671.3	671.3	671.3	671.2	671.2	671.1	671.0	670.9
670.7	670.6	670.5	670.4	670.3	670.1	669.9	669.7	669.6	669.5
669.3	669.1	668.9	668.5	668.2	667.9	667.5	667.1	666.7	666.4
666.0	665.8	665.5	665.3	665.1	664.9	664.7	664.6	664.4	664.3
664.2	664.1	663.9	663.9	663.8	663.7	663.6	663.6	663.5	663.5
663.4	663.3	663.3	663.2	663.2	663.1	663.1	663.1	663.0	663.0
662.9	662.9	662.8	662.8	662.8	662.7	662.7	662.7	662.6	662.6
662.6	662.6	662.6	662.5	662.5	662.5	662.5	662.4	662.4	662.4
662.4	662.4	662.4	662.3	662.3	662.3	662.3	662.3	662.3	662.3
662.3	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME

40

CFS	3911.	2444.	742.	537.	107302.
CMS	111.	69.	21.	15.	3038.
INCHES		9.09	11.04	11.09	11.09
MM		230.94	280.52	281.70	281.70
AC-FT		1212.	1472.	1478.	1478.
THOUS CU M		1495.	1815.	1823.	1823.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 671.3

AD-A087 538 NEW JERSEY DEPT OF ENVIRONMENTAL PROTECTION TRENTON F/G 13/13
NATIONAL DAM SAFETY PROGRAM. LAKE AMES DAM (NJ00337), PASSAIC R--ETC(U)
FEB 80 W A GUINAN DACW61-79-C-0011

UNCLASSIFIED NL

2 OF 2
AD
A087538

END
DATE
FILMED
9-80
DTIC

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STATION A9, PLAN 2, RTIO 3

OUTFLOW

10.	10.	10.	10.	10.	10.	9.	9.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	8.
8.	9.	10.	10.	11.	12.	14.	15.	16.	18.
19.	21.	34.	49.	61.	72.	82.	92.	99.	107.
113.	119.	124.	130.	136.	145.	157.	175.	199.	231.
412.	587.	718.	843.	960.	1113.	1224.	1328.	1422.	1515.
1601.	1690.	1787.	1901.	2056.	2256.	2492.	2781.	3101.	3410.
3654.	3829.	3903.	3911.	3856.	3751.	3615.	3452.	3251.	3038.
2835.	2651.	2472.	2292.	2104.	1909.	1712.	1539.	1363.	1194.
1038.	910.	810.	706.	611.	530.	460.	400.	349.	306.
268.	239.	233.	227.	218.	209.	199.	190.	180.	171.
161.	153.	144.	136.	128.	121.	114.	108.	102.	96.
91.	86.	80.	75.	70.	65.	60.	56.	51.	47.
43.	40.	36.	33.	31.	28.	26.	23.	21.	21.
21.	20.	20.	20.	20.	20.	20.	19.	19.	19.
19.	19.	18.	18.	18.	18.	18.	18.	17.	17.
17.	17.	17.	17.	16.	16.	16.	16.	16.	16.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3	662.3
662.3	662.3	662.3	662.3	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2	662.2
662.2	662.2	662.3	662.3	662.3	662.4	662.4	662.4	662.5	662.5
662.5	662.6	662.7	662.9	663.1	663.2	663.3	663.4	663.5	663.6
663.6	663.7	663.7	663.8	663.8	663.9	664.0	664.2	664.4	664.6
665.9	667.0	667.8	668.4	668.7	669.1	669.3	669.4	669.5	669.7
667.8	669.9	670.0	670.1	670.2	670.4	670.5	670.7	670.9	671.1
671.2	671.3	671.3	671.3	671.3	671.2	671.2	671.1	671.0	670.9
670.7	670.6	670.5	670.4	670.2	670.1	669.9	669.7	669.5	669.2
668.9	668.6	668.3	667.7	667.2	666.7	666.2	665.8	665.5	665.2

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```
    664.7     664.7     664.6     664.6     664.5     664.5     664.4     664.3     664.2     664.1
    664.1     664.0     663.9     663.8     663.8     663.7     663.6     663.6     663.5     663.5
    663.4     663.4     663.3     663.2     663.2     663.1     663.1     663.0     663.0     662.9
    662.9     662.8     662.8     662.7     662.7     662.7     662.6     662.6     662.6     662.6
    662.6     662.6     662.5     662.5     662.5     662.5     662.5     662.5     662.5     662.5
    662.5     662.5     662.5     662.5     662.5     662.5     662.5     662.5     662.5     662.5
    662.5     662.5     662.5     662.5     662.5     662.5     662.5     662.4     662.4     662.4

                                 PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
                        CFS      3911.    2417.     714.      516.       103270.
                        CMS       111.      68.      20.       15.         2924.
                     INCHES                8.99    10.63     10.67         10.67
                         MM              228.43   269.90    271.12        271.12
                      AC-FT               1199.    1416.     1422.         1422.
                 THOUS CU M               1478.    1747.     1755.         1755.

                               MAXIMUM STORAGE =        0.

MAXIMUM STAGE IS      671.3

          **********          **********          **********          **********          **********

                                             HYDROGRAPH ROUTING

           CHANNEL ROUTING -MOD PULS- REACH 2

                            ISTAQ    ICOMP    IECON    ITAPE     JPLT     JPRT    INAME   ISTAGE    IAUTO
                               A5        1        0        0        0        1        1        0        0

                                             ALL PLANS HAVE SAME
                                                ROUTING DATA
                     QLOSS    CLOSS      AVG     IRES    ISAME     IOPT     IPMP                LSTR
                       0.0    0.000     0.00        1        1        0        0                   0

                            NSTPS    NSTDL      LAG    AMSKK        X      TSK    STORA   ISPRAT
                                1        0        0    0.000    0.000    0.000      -1.        0

NORMAL DEPTH CHANNEL ROUTING
----------------------------

          QN(1)     QN(2)     QN(3)     ELNVT     ELMAX     RLNTH       SEL
          .0600     .0500     .0600     635.0     645.0     2300.    .01200

          CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
              0.00   645.00    80.00   641.00   160.00   637.00   160.00   635.00   172.00   635.00
            172.00   637.00   212.00   641.00   252.00   645.00

  STORAGE          0.00        .33        .67       1.00       1.34       1.98       3.06       4.58       6.54       8.93
                  11.77      15.04      18.75      22.90      27.49      32.52      37.99      43.90      50.24      57.02
```

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OUTFLOW	0.00	12.71	38.31	71.77	111.89	169.74	257.74	387.23	567.82	808.13
	1116.15	1499.37	1964.90	2519.54	3169.84	3922.10	4782.45	5756.83	6851.03	8070.69

STAGE	635.00	635.53	636.05	636.58	637.11	637.63	638.16	638.68	639.21	639.74
	640.26	640.79	641.32	641.84	642.37	642.89	643.42	643.95	644.47	645.00

FLOW	0.00	12.71	38.31	71.77	111.89	169.74	257.74	387.23	567.82	808.13
	1116.15	1499.37	1964.90	2519.54	3169.84	3922.10	4782.45	5756.83	6851.03	8070.69

STATION A5, PLAN 1, RTIO 3

OUTFLOW

10.	10.	10.	10.	10.	10.	10.	10.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.

9.	9.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
8.	8.	9.	9.	10.	11.	12.	13.	15.	16.
18.	19.	25.	37.	51.	64.	75.	86.	94.	102.
109.	115.	120.	125.	131.	138.	148.	162.	180.	205.
291.	479.	707.	911.	1083.	1238.	1387.	1456.	1443.	1454.
1499.	1591.	1698.	1802.	1927.	2093.	2301.	2584.	2919.	3243.
3540.	3748.	3865.	3906.	3884.	3804.	3682.	3528.	3342.	3144.
2950.	2756.	2573.	2405.	2245.	2072.	1885.	1697.	1534.	1422.
1320.	1206.	1087.	972.	866.	782.	712.	645.	581.	524.
471.	425.	384.	349.	317.	289.	263.	241.	221.	203.
187.	172.	158.	147.	136.	127.	119.	112.	104.	98.
93.	87.	82.	77.	73.	69.	64.	60.	56.	52.
49.	45.	42.	39.	37.	35.	32.	30.	28.	27.
25.	24.	22.	21.	20.	19.	18.	17.	16.	15.
14.	14.	13.	13.	12.	12.	11.	11.	10.	10.
10.	9.	9.	9.	8.	8.	8.	8.	7.	7.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	2.
3.	6.	8.	10.	11.	13.	14.	15.	15.	15.
15.	16.	17.	17.	18.	20.	21.	23.	26.	28.
30.	31.	32.	32.	32.	32.	31.	30.	29.	27.
26.	25.	23.	22.	21.	20.	18.	17.	15.	14.
14.	13.	12.	10.	9.	9.	8.	7.	7.	6.
5.	5.	5.	4.	4.	3.	3.	3.	3.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4
635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4
635.4	635.4	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.4	635.4	635.4	635.4	635.5	635.5	635.6	635.6
635.6	635.7	635.8	636.0	636.3	636.5	636.6	636.8	636.9	637.0
637.1	637.1	637.2	637.2	637.3	637.3	637.4	637.6	637.7	637.8
638.3	639.0	639.5	639.9	640.2	640.4	640.6	640.7	640.7	640.7
640.8	640.9	641.0	641.1	641.3	641.4	641.6	641.9	642.2	642.4
642.6	642.8	642.9	642.9	642.9	642.8	642.7	642.6	642.5	642.3
642.2	642.0	641.9	641.7	641.6	641.4	641.2	641.0	640.8	640.7
640.5	640.4	640.2	640.0	639.8	639.7	639.5	639.4	639.2	639.1
638.9	638.8	638.7	638.5	638.4	638.3	638.2	638.1	637.9	637.8
637.7	637.6	637.5	637.4	637.3	637.2	637.2	637.1	637.0	636.9
636.9	636.8	636.7	636.7	636.6	636.5	636.5	636.4	636.3	636.3
636.2	636.2	636.1	636.1	636.0	636.0	635.9	635.9	635.9	635.8
635.8	635.7	635.7	635.7	635.7	635.6	635.6	635.6	635.6	635.6

49

635.6	635.5	635.5	635.5	635.5	635.5	635.5	635.5	635.4	635.4
635.4	635.4	635.4	635.4	635.4	635.3	635.3	635.3	635.3	635.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3906.	2442.	742.	537.	107307.
CMS	111.	69.	21.	15.	3039.
INCHES		9.09	11.04	11.09	11.09
MM		230.82	280.52	281.71	281.71
AC-FT		1211.	1472.	1478.	1478.
THOUS CU M		1494.	1815.	1823.	1823.

MAXIMUM STORAGE = 32.

MAXIMUM STAGE IS 642.9

STATION A5, PLAN 2, RTIO 3

				OUTFLOW					
10.	10.	10.	10.	10.	10.	10.	10.	9.	9.
9.	9.	9.	9.	9.	9.	9.	9.	9.	9.
9.	9.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
8.	8.	9.	9.	10.	11.	12.	13.	15.	16.
18.	19.	25.	37.	51.	64.	75.	86.	94.	102.
109.	115.	120.	125.	131.	138.	148.	162.	180.	205.
290.	448.	609.	749.	877.	1014.	1148.	1263.	1363.	1457.
1549.	1639.	1731.	1836.	1969.	2149.	2365.	2628.	2937.	3254.
3537.	3745.	3868.	3908.	3883.	3802.	3681.	3532.	3349.	3142.
2939.	2746.	2564.	2389.	2206.	2015.	1824.	1640.	1466.	1298.
1135.	996.	840.	777.	680.	591.	515.	449.	391.	344.
302.	266.	244.	234.	225.	217.	208.	198.	189.	179.
170.	160.	151.	142.	134.	127.	120.	113.	106.	100.
94.	89.	84.	78.	73.	69.	64.	59.	55.	50.
46.	43.	39.	36.	33.	30.	28.	26.	23.	22.
21.	21.	20.	20.	20.	20.	20.	20.	19.	19.
19.	19.	19.	18.	18.	18.	18.	18.	18.	17.
17.	17.	17.	17.	17.	16.	16.	16.	16.	16.
				STOR					
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	2.	2.	2.	2.	2.	2.
3.	5.	7.	8.	10.	11.	12.	13.	14.	15.
15.	16.	17.	18.	19.	20.	22.	24.	26.	28.
30.	31.	32.	32.	32.	32.	31.	30.	29.	27.
26.	24.	23.	22.	21.	19.	18.	16.	15.	13.
12.	11.	10.	9.	8.	7.	6.	5.	5.	4.
4.	3.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
				STAGE					
635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4
635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4	635.4
635.4	635.4	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.4	635.4	635.4	635.4	635.5	635.5	635.6	635.6
635.6	635.7	635.8	636.0	636.3	636.5	636.6	636.8	636.9	637.0
637.1	637.1	637.2	637.2	637.3	637.3	637.4	637.6	637.7	637.8
638.3	638.9	639.3	639.6	639.9	640.1	640.3	640.5	640.6	640.7

640.8	640.9	641.1	641.2	641.3	641.5	641.7	641.9	642.2	642.4
642.6	642.8	642.9	642.9	642.9	642.8	642.7	642.6	642.5	642.3
642.2	642.0	641.9	641.7	641.5	641.4	641.2	640.9	640.7	640.5
640.3	640.1	639.9	639.7	639.5	639.3	639.1	638.9	638.7	638.5
638.3	638.2	638.1	638.0	638.0	637.9	637.9	637.8	637.7	637.7
637.6	637.5	637.5	637.4	637.3	637.2	637.2	637.1	637.0	636.9
636.9	636.8	636.7	636.7	636.6	636.5	636.5	636.4	636.3	636.2
636.2	636.1	636.1	636.0	635.9	635.9	635.8	635.8	635.7	635.7
635.7	635.7	635.7	635.7	635.7	635.7	635.7	635.7	635.7	635.7
635.7	635.7	635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6
635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6	635.6

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3908.	2416.	714.	516.	103261.
CMS	111.	68.	20.	15.	2924.
INCHES		8.99	10.63	10.67	10.67
MM		228.30	269.88	271.09	271.09
AC-FT		1198.	1416.	1422.	1422.
THOUS CU M		1477.	1747.	1754.	1754.

MAXIMUM STORAGE = 32.

MAXIMUM STAGE IS 642.9

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SUB-AREA RUNOFF COMPUTATION

DEVELOP LAKE AMES INFLOW HYDROGRAPH - SUB-AREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A6	0	0	0	0	1	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	2	2.80	0.00	2.80	.80	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	22.70	113.00	123.00	132.00	0.00	0.00	0.00

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 0.00 LAG= 1.27

RECESSION DATA
STRTQ= -3.00 QRCSN= 0.00 RTIOR= 1.00

UNIT HYDROGRAPH 40 END OF PERIOD ORDINATES, TC= 0.00 HOURS, LAG= 1.27 VOL= 1.00

46.	142.	273.	458.	685.	862.	967.	998.	984.	907.
810.	702.	559.	443.	361.	295.	246.	202.	165.	134.
110.	91.	73.	60.	49.	40.	33.	27.	22.	18.

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15. 12. 10. 9. 7. 6. 4. 3. 2. 1.

END-OF-PERIOD FLOW

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.10	1	.02	0.00	.02	8.	1.01	16.50	101	.48	.46	.02	9824.
1.01	.20	2	.02	0.00	.02	8.	1.01	17.00	102	.48	.46	.02	9723.
1.01	.30	3	.02	0.00	.02	8.	1.01	17.10	103	.38	.36	.02	9370.
1.01	.40	4	.02	0.00	.02	8.	1.01	17.20	104	.38	.36	.02	8893.
1.01	.50	5	.02	0.00	.02	8.	1.01	17.30	105	.38	.36	.02	8297.
1.01	1.00	6	.02	0.00	.02	8.	1.01	17.40	106	.38	.36	.02	7615.
1.01	1.10	7	.02	0.00	.02	8.	1.01	17.50	107	.38	.36	.02	7008.
1.01	1.20	8	.02	0.00	.02	8.	1.01	18.00	108	.38	.36	.02	6517.
1.01	1.30	9	.02	0.00	.02	8.	1.01	18.10	109	.03	.01	.02	6082.
1.01	1.40	10	.02	0.00	.02	8.	1.01	18.20	110	.03	.01	.02	5685.
1.01	1.50	11	.02	0.00	.02	8.	1.01	18.30	111	.03	.01	.02	5277.
1.01	2.00	12	.02	0.00	.02	8.	1.01	18.40	112	.03	.01	.02	4847.
1.01	2.10	13	.02	0.00	.02	8.	1.01	18.50	113	.03	.01	.02	4377.
1.01	2.20	14	.02	0.00	.02	8.	1.01	19.00	114	.03	.01	.02	3886.
1.01	2.30	15	.02	0.00	.02	8.	1.01	19.10	115	.03	.01	.02	3396.
1.01	2.40	16	.02	0.00	.02	8.	1.01	19.20	116	.03	.01	.02	2921.
1.01	2.50	17	.02	0.00	.02	8.	1.01	19.30	117	.03	.01	.02	2474.
1.01	3.00	18	.02	0.00	.02	8.	1.01	19.40	118	.03	.01	.02	2075.
1.01	3.10	19	.02	0.00	.02	8.	1.01	19.50	119	.03	.01	.02	1721.
1.01	3.20	20	.02	0.00	.02	8.	1.01	20.00	120	.03	.01	.02	1422.
1.01	3.30	21	.02	0.00	.02	8.	1.01	20.10	121	.03	.01	.02	1181.
1.01	3.40	22	.02	0.00	.02	8.	1.01	20.20	122	.03	.01	.02	988.
1.01	3.50	23	.02	0.00	.02	8.	1.01	20.30	123	.03	.01	.02	831.
1.01	4.00	24	.02	0.00	.02	8.	1.01	20.40	124	.03	.01	.02	703.
1.01	4.10	25	.02	0.00	.02	8.	1.01	20.50	125	.03	.01	.02	597.
1.01	4.20	26	.02	0.00	.02	8.	1.01	21.00	126	.03	.01	.02	511.
1.01	4.30	27	.02	0.00	.02	8.	1.01	21.10	127	.03	.01	.02	440.
1.01	4.40	28	.02	0.00	.02	8.	1.01	21.20	128	.03	.01	.02	382.
1.01	4.50	29	.02	0.00	.02	8.	1.01	21.30	129	.03	.01	.02	333.
1.01	5.00	30	.02	0.00	.02	8.	1.01	21.40	130	.03	.01	.02	292.
1.01	5.10	31	.02	0.00	.02	8.	1.01	21.50	131	.03	.01	.02	259.
1.01	5.20	32	.02	0.00	.02	8.	1.01	22.00	132	.03	.01	.02	229.
1.01	5.30	33	.02	0.00	.02	8.	1.01	22.10	133	.03	.01	.02	205.
1.01	5.40	34	.02	0.00	.02	8.	1.01	22.20	134	.03	.01	.02	187.
1.01	5.50	35	.02	0.00	.02	8.	1.01	22.30	135	.03	.01	.02	174.
1.01	6.00	36	.02	0.00	.02	8.	1.01	22.40	136	.03	.01	.02	164.
1.01	6.10	37	.05	0.00	.05	8.	1.01	22.50	137	.03	.01	.02	155.
1.01	6.20	38	.05	0.00	.05	8.	1.01	23.00	138	.03	.01	.02	148.
1.01	6.30	39	.05	0.00	.05	8.	1.01	23.10	139	.03	.01	.02	143.
1.01	6.40	40	.05	0.00	.05	8.	1.01	23.20	140	.03	.01	.02	138.
1.01	6.50	41	.05	0.00	.05	8.	1.01	23.30	141	.03	.01	.02	134.
1.01	7.00	42	.05	0.00	.05	8.	1.01	23.40	142	.03	.01	.02	131.
1.01	7.10	43	.05	.00	.05	9.	1.01	23.50	143	.03	.01	.02	129.
1.01	7.20	44	.05	.03	.02	11.	1.02	0.00	144	.03	.01	.02	127.
1.01	7.30	45	.05	.03	.02	16.	1.02	.10	145	0.00	0.00	0.00	125.
1.01	7.40	46	.05	.03	.02	26.	1.02	.20	146	0.00	0.00	0.00	122.
1.01	7.50	47	.05	.03	.02	43.	1.02	.30	147	0.00	0.00	0.00	118.
1.01	8.00	48	.05	.03	.02	67.	1.02	.40	148	0.00	0.00	0.00	113.
1.01	8.10	49	.05	.03	.02	96.	1.02	.50	149	0.00	0.00	0.00	106.
1.01	8.20	50	.05	.03	.02	129.	1.02	1.00	150	0.00	0.00	0.00	97.
1.01	8.30	51	.05	.03	.02	163.	1.02	1.10	151	0.00	0.00	0.00	87.
1.01	8.40	52	.05	.03	.02	195.	1.02	1.20	152	0.00	0.00	0.00	76.
1.01	8.50	53	.05	.03	.02	226.	1.02	1.30	153	0.00	0.00	0.00	66.
1.01	9.00	54	.05	.03	.02	253.	1.02	1.40	154	0.00	0.00	0.00	56.
1.01	9.10	55	.05	.03	.02	276.	1.02	1.50	155	0.00	0.00	0.00	48.

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1.01	9.20	56	.05	.03	.02	294.	1.02	2.00	156	0.00	0.00	0.00	40.
1.01	9.30	57	.05	.03	.02	309.	1.02	2.10	157	0.00	0.00	0.00	34.
1.01	9.40	58	.05	.03	.02	321.	1.02	2.20	158	0.00	0.00	0.00	29.
1.01	9.50	59	.05	.03	.02	330.	1.02	2.30	159	0.00	0.00	0.00	26.
1.01	10.00	60	.05	.03	.02	338.	1.02	2.40	160	0.00	0.00	0.00	23.
1.01	10.10	61	.05	.03	.02	345.	1.02	2.50	161	0.00	0.00	0.00	20.
1.01	10.20	62	.05	.03	.02	351.	1.02	3.00	162	0.00	0.00	0.00	18.
1.01	10.30	63	.05	.03	.02	355.	1.02	3.10	163	0.00	0.00	0.00	16.
1.01	10.40	64	.05	.03	.02	359.	1.02	3.20	164	0.00	0.00	0.00	15.
1.01	10.50	65	.05	.03	.02	362.	1.02	3.30	165	0.00	0.00	0.00	13.
1.01	11.00	66	.05	.03	.02	364.	1.02	3.40	166	0.00	0.00	0.00	13.
1.01	11.10	67	.05	.03	.02	366.	1.02	3.50	167	0.00	0.00	0.00	12.
1.01	11.20	68	.05	.03	.02	368.	1.02	4.00	168	0.00	0.00	0.00	11.
1.01	11.30	69	.05	.03	.02	369.	1.02	4.10	169	0.00	0.00	0.00	11.
1.01	11.40	70	.05	.03	.02	370.	1.02	4.20	170	0.00	0.00	0.00	10.
1.01	11.50	71	.05	.03	.02	371.	1.02	4.30	171	0.00	0.00	0.00	10.
1.01	12.00	72	.05	.03	.02	372.	1.02	4.40	172	0.00	0.00	0.00	10.
1.01	12.10	73	.34	.33	.02	386.	1.02	4.50	173	0.00	0.00	0.00	9.
1.01	12.20	74	.34	.33	.02	427.	1.02	5.00	174	0.00	0.00	0.00	9.
1.01	12.30	75	.34	.33	.02	507.	1.02	5.10	175	0.00	0.00	0.00	9.
1.01	12.40	76	.34	.33	.02	641.	1.02	5.20	176	0.00	0.00	0.00	9.
1.01	12.50	77	.34	.33	.02	841.	1.02	5.30	177	0.00	0.00	0.00	9.
1.01	13.00	78	.34	.33	.02	1093.	1.02	5.40	178	0.00	0.00	0.00	9.
1.01	13.10	79	.41	.39	.02	1378.	1.02	5.50	179	0.00	0.00	0.00	9.
1.01	13.20	80	.41	.39	.02	1675.	1.02	6.00	180	0.00	0.00	0.00	9.
1.01	13.30	81	.41	.39	.02	1985.	1.02	6.10	181	0.00	0.00	0.00	8.
1.01	13.40	82	.41	.39	.02	2281.	1.02	6.20	182	0.00	0.00	0.00	8.
1.01	13.50	83	.41	.39	.02	2565.	1.02	6.30	183	0.00	0.00	0.00	8.
1.01	14.00	84	.41	.39	.02	2829.	1.02	6.40	184	0.00	0.00	0.00	8.
1.01	14.10	85	.51	.50	.02	3063.	1.02	6.50	185	0.00	0.00	0.00	8.
1.01	14.20	86	.51	.50	.02	3275.	1.02	7.00	186	0.00	0.00	0.00	8.
1.01	14.30	87	.51	.50	.02	3475.	1.02	7.10	187	0.00	0.00	0.00	8.
1.01	14.40	88	.51	.50	.02	3670.	1.02	7.20	188	0.00	0.00	0.00	8.
1.01	14.50	89	.51	.50	.02	3868.	1.02	7.30	189	0.00	0.00	0.00	8.
1.01	15.00	90	.51	.50	.02	4063.	1.02	7.40	190	0.00	0.00	0.00	8.
1.01	15.10	91	.47	.45	.02	4247.	1.02	7.50	191	0.00	0.00	0.00	8.
1.01	15.20	92	.78	.76	.02	4427.	1.02	8.00	192	0.00	0.00	0.00	8.
1.01	15.30	93	1.40	1.39	.02	4645.	1.02	8.10	193	0.00	0.00	0.00	8.
1.01	15.40	94	3.51	3.49	.02	5035.	1.02	8.20	194	0.00	0.00	0.00	8.
1.01	15.50	95	1.01	1.00	.02	5622.	1.02	8.30	195	0.00	0.00	0.00	8.
1.01	16.00	96	.62	.61	.02	6389.	1.02	8.40	196	0.00	0.00	0.00	8.
1.01	16.10	97	.48	.46	.02	7345.	1.02	8.50	197	0.00	0.00	0.00	8.
1.01	16.20	98	.48	.46	.02	8378.	1.02	9.00	198	0.00	0.00	0.00	8.
1.01	16.30	99	.48	.46	.02	9190.	1.02	9.10	199	0.00	0.00	0.00	8.
1.01	16.40	100	.48	.46	.02	9674.	1.02	9.20	200	0.00	0.00	0.00	8.

SUM	23.97	21.29	2.69	232315.
	(609.)	(541.)	(68.)	(6578.43)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	9824.	5559.	1610.	1162.	232322.
CMS	278.	157.	46.	33.	6579.
INCHES		18.47	21.40	21.44	21.44
MM		469.11	543.49	544.57	544.57
AC-FT		2757.	3194.	3200.	3200.
THOUS CU M		3400.	3939.	3947.	3947.

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HYDROGRAPH AT STA A6 FOR PLAN 1, RTIO 3

4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	5.	8.	13.	21.	33.	48.	64.
81.	98.	113.	126.	138.	147.	154.	160.	165.	169.
173.	175.	177.	179.	181.	182.	183.	184.	184.	185.
185.	186.	193.	214.	254.	321.	421.	546.	689.	839.
992.	1140.	1283.	1414.	1531.	1637.	1738.	1835.	1934.	2032.
2123.	2213.	2322.	2517.	2811.	3195.	3673.	4189.	4595.	4837.
4912.	4862.	4685.	4446.	4149.	3807.	3504.	3258.	3041.	2842.
2639.	2424.	2189.	1943.	1698.	1460.	1237.	1037.	861.	711.
590.	494.	416.	351.	299.	255.	220.	191.	167.	146.
129.	115.	103.	94.	87.	82.	78.	74.	71.	69.
67.	66.	64.	63.	62.	61.	59.	57.	53.	48.
43.	38.	33.	28.	24.	20.	17.	15.	13.	11.
10.	9.	8.	7.	7.	6.	6.	6.	5.	5.
5.	5.	5.	5.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
4.	4.	4.	4.	4.	4.	4.	4.	4.	4.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	4912.	2780.	805.	581.	116161.
CMS	139.	79.	23.	16.	3289.
INCHES		9.23	10.70	10.72	10.72
MM		234.56	271.74	272.29	272.29
AC-FT		1378.	1597.	1600.	1600.
THOUS CU M		1700.	1970.	1974.	1974.

PLAN 2 SAME AS PLAN 1

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COMBINE HYDROGRAPHS

COMBINE SUB-AREA 1 & SUB-AREA 2 FLOW CONTRIBUTIONS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A7	2	0	0	0	1	1	0	0

SUM OF 2 HYDROGRAPHS AT A7 PLAN 1 RTIO 3

14.	14.	14.	14.	14.	14.	14.	14.	14.	14.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	12.	12.	12.	12.	12.
12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	13.	15.	20.	28.	40.	55.	72.
89.	106.	121.	135.	148.	158.	166.	173.	180.	186.
190.	195.	203.	216.	232.	246.	258.	269.	279.	287.
295.	301.	313.	339.	385.	459.	569.	708.	870.	1045.
1283.	1619.	1990.	2325.	2614.	2875.	3125.	3291.	3377.	3485.
3622.	3804.	4021.	4319.	4738.	5287.	5974.	6773.	7514.	8080.
8452.	8610.	8550.	8353.	8033.	7612.	7186.	6786.	6383.	5986.
5589.	5190.	4762.	4348.	3943.	3532.	3123.	2734.	2395.	2132.
1910.	1700.	1503.	1323.	1164.	1037.	932.	836.	747.	670.
600.	539.	487.	443.	404.	370.	341.	315.	292.	272.
254.	238.	223.	210.	199.	188.	178.	168.	157.	147.
136.	125.	115.	106.	97.	89.	81.	75.	69.	64.
59.	54.	50.	47.	44.	41.	38.	36.	34.	32.
30.	28.	27.	25.	24.	23.	22.	21.	20.	19.
19.	18.	17.	17.	16.	16.	15.	15.	15.	14.
14.	14.	13.	13.	13.	12.	12.	12.	12.	11.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8610.	5186.	1547.	1117.	223468.
CMS	244.	147.	44.	32.	6328.
INCHES		9.10	10.86	10.90	10.90
MM		231.18	275.86	276.73	276.73
AC-FT		2571.	3068.	3078.	3078.
THOUS CU M		3172.	3785.	3797.	3797.

SUM OF 2 HYDROGRAPHS AT A7 PLAN 2 RTIO 3

14.	14.	14.	14.	14.	14.	14.	14.	14.	14.
13.	13.	13.	13.	13.	13.	13.	13.	13.	13.
13.	13.	13.	13.	13.	12.	12.	12.	12.	12.
12.	12.	12.	12.	12.	12.	12.	12.	12.	12.
12.	12.	12.	13.	15.	20.	28.	40.	55.	72.
89.	106.	121.	135.	148.	158.	166.	173.	180.	186.
190.	195.	203.	216.	232.	246.	258.	269.	279.	287.
295.	301.	313.	339.	385.	459.	569.	708.	870.	1045.
1282.	1588.	1891.	2163.	2408.	2651.	2885.	3098.	3297.	3489.
3672.	3852.	4054.	4353.	4779.	5343.	6037.	6817.	7532.	8091.
8448.	8607.	8553.	8354.	8032.	7610.	7186.	6790.	6390.	5984.
5578.	5169.	4753.	4332.	3904.	3475.	3061.	2677.	2326.	2009.
1726.	1491.	1295.	1128.	979.	846.	735.	640.	558.	490.
431.	381.	347.	327.	312.	299.	285.	273.	260.	248.
237.	226.	215.	206.	197.	188.	179.	170.	159.	148.
138.	127.	116.	106.	97.	89.	81.	74.	68.	62.
56.	51.	47.	43.	40.	37.	34.	31.	29.	27.
26.	26.	25.	25.	25.	24.	24.	24.	24.	23.
23.	23.	23.	23.	22.	22.	22.	22.	22.	22.
21.	21.	21.	21.	21.	21.	20.	20.	20.	20.

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8607.	5158.	1518.	1097.	219423.
CMS	244.	146.	43.	31.	6213.
INCHES		9.05	10.66	10.70	10.70
MM		229.93	270.75	271.72	271.72

```
THOUS CU M                 3155.     3715.     3728.       3728.

          **********         **********         **********         **********         **********

                                   HYDROGRAPH ROUTING

            ROUTE INFLOW HYDROGRAPH THROUGH LAKE AMES

                        ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                           A8       1       0       0       0       1       1       0       0

                                   ALL PLANS HAVE SAME
                                       ROUTING DATA
                  QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                    0.0   0.000    0.00       1       1       0       0               0

                        NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                            1       0       0   0.000   0.000   0.000    155.      -1

STAGE     634.90     635.20     636.20     637.10     637.40     637.60     639.00     640.00     641.00

FLOW        0.00      19.00     200.00     483.00     633.00     779.00    2621.00    4618.00    7140.00

CAPACITY=        47.      155.      161.      166.      197.      203.      236.      280.

ELEVATION=      628.      635.      635.      636.      637.      637.      639.      641.

                      CREL   SPWID    COQW    EXPW   ELEVL    COOL   CAREA    EXPL
                     634.9     0.0     0.0     0.0     0.0     0.0     0.0     0.0

                                       DAM DATA
                                TOPEL    COQD    EXPD  DAMWID
                                637.1     0.0     0.0      0.

                                   DAM BREACH DATA
                         BRWID       Z    ELBM   TFAIL    WSEL  FAILEL
                           26.    1.00  628.40    1.00  634.90  637.10
```

•OVN•

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STATION AR, PLAN 1, RATIO 3

BEGIN DAM FAILURE AT 13.17 HOURS

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	2.	2.	3.	3.	4.	4.	5.	5.
5.	6.	6.	6.	7.	7.	7.	7.	8.	8.
8.	8.	8.	9.	9.	9.	9.	9.	9.	9.
10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	12.	13.	14.	16.
19.	30.	41.	53.	66.	77.	87.	97.	107.	116.
125.	133.	141.	149.	158.	168.	178.	188.	199.	215.
230.	244.	256.	270.	289.	315.	355.	412.	491.	790.
1197.	1640.	2109.	2591.	3054.	2923.	2958.	3071.	3205.	3323.
3451.	3606.	3831.	4090.	4427.	4078.	5460.	6170.	7029.	7721.
8213.	8501.	8572.	8464.	8219.	7860.	7444.	7032.	6630.	6238.
5887.	5496.	5089.	4677.	4266.	3861.	3495.	3187.	2893.	2613.
2354.	2150.	1950.	1738.	1597.	1456.	1327.	1209.	1103.	1005.
917.	837.	765.	700.	642.	591.	545.	503.	466.	433.
403.	376.	352.	330.	310.	292.	275.	260.	246.	232.
219.	207.	195.	184.	173.	163.	153.	144.	136.	127.
120.	113.	106.	100.	94.	89.	84.	79.	75.	71.
67.	64.	60.	57.	55.	52.	49.	47.	45.	43.
41.	39.	38.	36.	35.	33.	32.	31.	30.	29.
28.	27.	26.	25.	24.	23.	23.	22.	21.	21.

STORAGE

155.	155.	156.	156.	156.	156.	156.	156.	156.	157.
157.	157.	157.	157.	157.	157.	157.	157.	157.	157.
158.	158.	158.	158.	150.	150.	158.	158.	158.	158.
158.	158.	158.	158.	158.	158.	158.	158.	158.	158.
158.	158.	158.	158.	158.	158.	159.	159.	159.	160.
161.	162.	163.	164.	165.	166.	168.	169.	170.	171.
172.	172.	173.	174.	175.	176.	177.	178.	179.	180.
181.	182.	183.	184.	185.	187.	189.	193.	197.	202.
204.	205.	204.	201.	196.	193.	194.	197.	199.	202.
204.	207.	209.	212.	216.	221.	227.	235.	242.	248.
252.	255.	255.	254.	252.	249.	246.	242.	239.	236.
232.	228.	223.	219.	214.	210.	205.	199.	193.	186.
179.	173.	167.	161.	155.	149.	144.	139.	134.	129.
124.	120.	116.	112.	109.	106.	103.	100.	98.	95.
93.	91.	89.	88.	86.	85.	83.	82.	81.	80.
78.	77.	76.	75.	74.	73.	72.	71.	70.	69.
68.	67.	67.	66.	65.	64.	64.	63.	63.	62.
62.	61.	61.	60.	60.	59.	59.	59.	58.	58.
58.	57.	57.	57.	56.	56.	56.	56.	55.	55.
55.	55.	55.	55.	54.	54.	54.	54.	54.	54.

STAGE

634.9	634.9	634.9	634.9	634.9	635.0	635.0	635.0	635.0	635.0
635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0
635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0
635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1
635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.2
635.2	635.3	635.3	635.4	635.5	635.5	635.6	635.6	635.7	635.7
635.8	635.8	635.9	635.9	636.0	636.0	636.1	636.1	636.2	636.2

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636.3	636.3	636.4	636.4	636.5	636.6	636.7	636.9	637.1	637.3
637.5	637.5	637.4	637.3	637.1	636.9	636.9	637.1	637.2	637.3
637.4	637.6	637.7	637.8	638.0	638.3	638.6	638.9	639.3	639.6
639.7	639.8	639.9	639.8	639.7	639.6	639.4	639.3	639.1	639.0
638.8	638.6	638.4	638.2	637.9	637.7	637.5	637.2	636.9	636.5
636.2	635.9	635.6	635.2	634.9	634.6	634.2	633.9	633.6	633.3
633.1	632.8	632.6	632.3	632.1	631.9	631.8	631.6	631.5	631.3
631.2	631.1	631.0	630.8	630.8	630.7	630.6	630.5	630.4	630.4
630.3	630.2	630.2	630.1	630.0	630.0	629.9	629.8	629.8	629.7
629.7	629.6	629.6	629.5	629.5	629.4	629.4	629.4	629.3	629.3
629.3	629.2	629.2	629.2	629.2	629.1	629.1	629.1	629.1	629.1
629.0	629.0	629.0	629.0	629.0	628.9	628.9	628.9	628.9	628.9
628.9	628.9	628.9	628.9	628.8	628.8	628.8	628.8	628.8	628.8

PEAK OUTFLOW IS 8572. AT TIME 17.17 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8572.	5217.	1600.	1154.	230882.
CMS	243.	148.	45.	33.	6538.
INCHES		9.16	11.23	11.26	11.26
MM		232.60	285.27	285.92	285.92
AC-FT		2587.	3173.	3180.	3180.
THOUS CU M		3191.	3914.	3923.	3923.

THE DAM BREACH HYDROGRAPH WAS DEVELOPED USING A TIME INTERVAL OF .021 HOURS DURING BREACH FORMATION.
DOWNSTREAM CALCULATIONS WILL USE A TIME INTERVAL OF .167 HOURS.
THIS TABLE COMPARES THE HYDROGRAPH FOR DOWNSTREAM CALCULATIONS WITH THE COMPUTED BREACH HYDROGRAPH.
INTERMEDIATE FLOWS ARE INTERPOLATED FROM END-OF-PERIOD VALUES.

TIME (HOURS)	TIME FROM BEGINNING OF BREACH (HOURS)	INTERPOLATED BREACH HYDROGRAPH (CFS)	-	COMPUTED BREACH HYDROGRAPH (CFS)	=	ERROR (CFS)	ACCUMULATED ERROR (CFS)	ACCUMULATED ERROR (AC-FT)
13.167	0.000	491.		491.		0.	0.	0.
13.188	.021	528.		515.		13.	13.	0.
13.208	.042	565.		546.		19.	31.	0.
13.229	.063	603.		581.		21.	53.	0.
13.250	.083	640.		619.		21.	74.	0.
13.271	.104	677.		659.		18.	92.	0.
13.292	.125	715.		701.		14.	106.	0.
13.313	.146	752.		745.		7.	113.	0.
13.333	.167	790.		790.		0.	113.	0.
13.354	.188	841.		836.		5.	118.	0.
13.375	.208	891.		883.		8.	126.	0.
13.396	.229	942.		932.		10.	137.	0.
13.417	.250	993.		985.		8.	145.	0.
13.438	.271	1044.		1038.		6.	151.	0.
13.458	.292	1095.		1091.		4.	156.	0.
13.479	.313	1146.		1144.		2.	158.	0.
13.500	.333	1197.		1197.		-0.	158.	0.
13.521	.354	1252.		1250.		2.	160.	0.
13.542	.375	1308.		1304.		3.	163.	0.
13.563	.396	1363.		1359.		4.	167.	0.
13.583	.417	1418.		1414.		4.	171.	0.
13.604	.438	1474.		1470.		4.	174.	0.
13.625	.458	1529.		1526.		3.	177.	0.
13.646	.479	1584.		1583.		1.	179.	0.
13.667	.500	1640.		1640.		0.	179.	0.
13.688	.521	1698.		1697.		1.	180.	0.
13.708	.542	1757.		1755.		2.	182.	0.
13.729	.563	1816.		1813.		3.	185.	0.
13.750	.583	1874.		1872.		3.	187.	0.
13.771	.604	1933.		1931.		2.	190.	0.
13.792	.625	1991.		1990.		2.	191.	0.
13.813	.646	2050.		2049.		1.	192.	0.
13.833	.667	2109.		2109.		0.	192.	0.
13.854	.688	2169.		2168.		1.	193.	0.
13.875	.708	2229.		2227.		2.	195.	0.
13.896	.729	2289.		2286.		3.	198.	0.
13.917	.750	2350.		2347.		3.	201.	0.
13.938	.771	2410.		2408.		1.	202.	0.
13.958	.792	2470.		2470.		1.	203.	0.
13.979	.812	2530.		2530.		0.	203.	0.
14.000	.833	2591.		2591.		0.	203.	0.
14.021	.854	2649.		2651.		-2.	201.	0.
14.042	.875	2707.		2710.		-3.	198.	0.
14.063	.896	2765.		2768.		-3.	195.	0.
14.083	.917	2823.		2826.		-3.	191.	0.
14.104	.937	2881.		2883.		-2.	189.	0.
14.125	.958	2939.		2939.		-0.	189.	0.
14.146	.979	2996.		2994.		2.	191.	0.
14.167	1.000	3054.		3054.		0.	191.	0.

OVF

STATION AR

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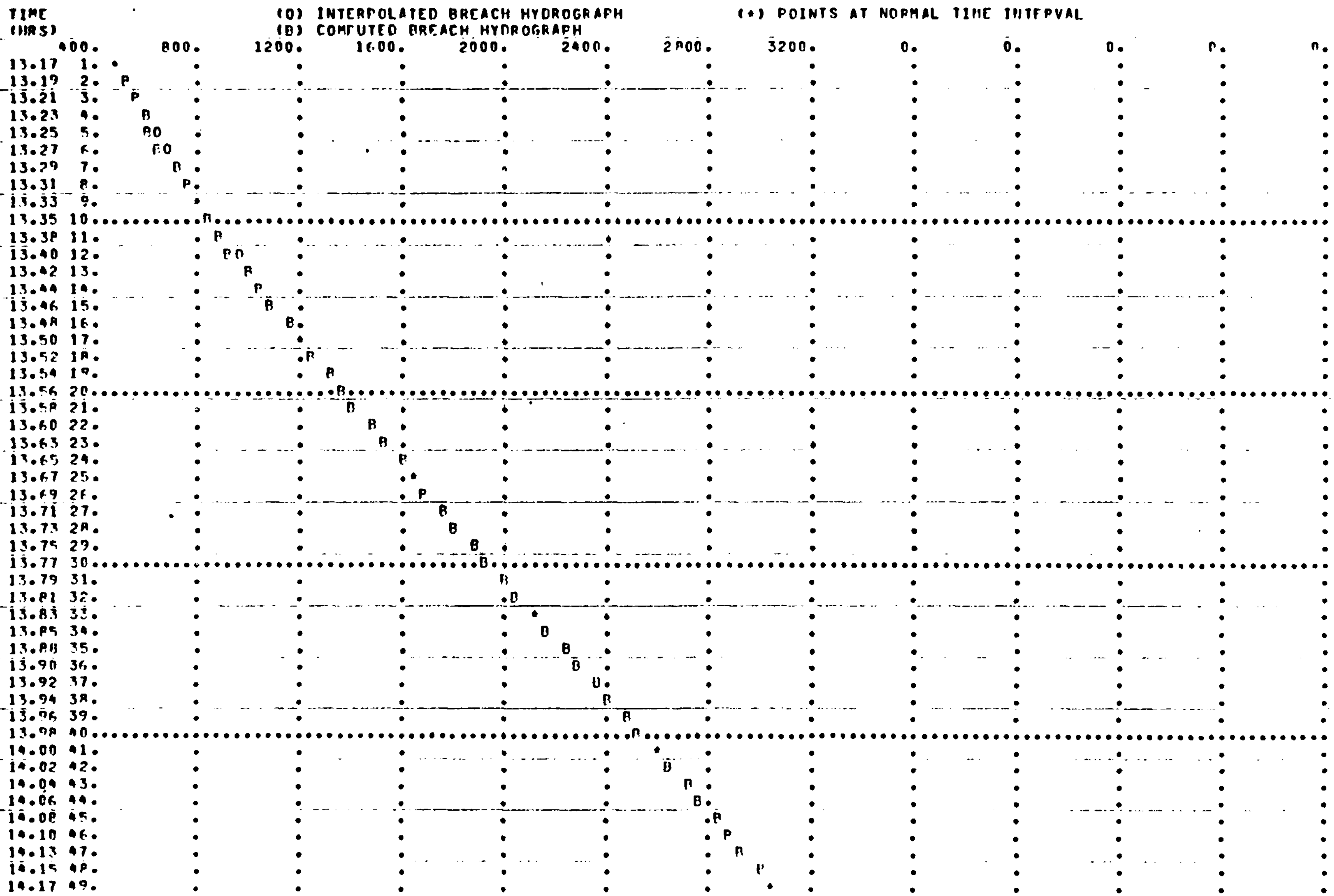

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DAM.

DAM BREACH DATA

BRWID	Z	ELBM	TFAIL	WSEL	FAILEL
26.	1.00	628.40	1.00	634.90	650.00

STATION AB, PLAN 2, RATIO 3

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	2.	2.	3.	3.	4.	4.	5.	5.
5.	6.	6.	6.	7.	7.	7.	7.	8.	8.
8.	8.	8.	9.	9.	9.	9.	9.	9.	9.

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10.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	12.	13.	14.	16.
12.	30.	41.	53.	66.	77.	87.	97.	107.	116.
125.	133.	141.	149.	158.	168.	178.	188.	199.	215.
230.	244.	256.	270.	289.	316.	355.	412.	490.	628.
867.	1214.	1535.	1836.	2110.	2366.	2612.	2902.	3129.	3332.
3523.	3707.	3895.	4132.	4466.	4969.	5605.	6331.	7076.	7725.
8206.	8490.	8569.	8467.	8225.	7868.	7453.	7043.	6643.	6241.
5835.	5428.	5016.	4601.	4229.	3814.	3394.	2990.	2617.	2343.
2052.	1781.	1544.	1341.	1166.	1011.	876.	768.	702.	632.
582.	530.	482.	453.	426.	402.	380.	360.	341.	323.
307.	292.	278.	264.	252.	240.	228.	218.	207.	198.
191.	184.	176.	169.	161.	152.	144.	136.	128.	121.
113.	106.	99.	93.	86.	81.	75.	70.	64.	59.
55.	51.	47.	44.	42.	39.	37.	35.	34.	32.
31.	30.	29.	28.	27.	27.	26.	25.	25.	25.
24.	24.	23.	23.	23.	22.	22.	22.	22.	21.

STORAGE

155.	155.	156.	156.	156.	156.	156.	156.	156.	157.
157.	157.	157.	157.	157.	157.	157.	157.	157.	157.
158.	158.	158.	158.	158.	158.	158.	158.	158.	158.
158.	158.	158.	158.	158.	158.	158.	158.	158.	158.
158.	158.	158.	158.	158.	158.	159.	159.	159.	160.
161.	162.	163.	164.	165.	166.	168.	169.	170.	171.
172.	172.	173.	174.	175.	176.	177.	178.	179.	180.
181.	182.	183.	184.	185.	187.	189.	193.	197.	203.
209.	214.	219.	224.	228.	232.	236.	239.	242.	244.
246.	248.	250.	253.	256.	261.	267.	273.	279.	285.
289.	292.	292.	292.	289.	286.	283.	279.	276.	272.
269.	265.	261.	258.	254.	249.	245.	240.	236.	232.
227.	223.	219.	216.	213.	211.	209.	207.	205.	203.
201.	199.	197.	195.	193.	192.	191.	189.	188.	187.
186.	185.	184.	184.	183.	182.	181.	181.	180.	179.
179.	178.	177.	176.	175.	174.	174.	173.	172.	171.
170.	169.	169.	168.	167.	167.	166.	166.	165.	165.
164.	164.	164.	163.	163.	163.	163.	163.	162.	162.
162.	162.	162.	162.	162.	162.	162.	162.	162.	162.
161.	161.	161.	161.	161.	161.	161.	161.	161.	161.

STAGE

634.9	634.9	634.9	634.9	634.9	635.0	635.0	635.0	635.0	635.0
635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0
635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0	635.0
635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1
635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.1	635.2
635.2	635.3	635.3	635.4	635.5	635.5	635.6	635.6	635.7	635.7
635.8	635.8	635.9	635.9	636.0	636.0	636.1	636.1	636.2	636.2
636.3	636.3	636.4	636.4	636.5	636.6	636.7	636.9	637.1	637.4
637.7	637.9	638.2	638.4	638.6	638.8	639.0	639.1	639.3	639.4
639.5	639.5	639.6	639.8	639.9	640.1	640.4	640.7	641.0	641.2
641.4	641.5	641.6	641.5	641.4	641.3	641.1	641.0	640.8	640.6
640.5	640.3	640.2	640.0	639.8	639.6	639.4	639.2	639.0	638.8
638.6	638.4	638.2	638.0	637.9	637.8	637.7	637.6	637.5	637.4
637.3	637.2	637.1	637.0	636.9	636.8	636.8	636.7	636.6	636.6
636.5	636.5	636.4	636.4	636.4	636.3	636.3	636.3	636.2	636.2
636.2	636.1	636.1	636.0	636.0	635.9	635.9	635.8	635.8	635.8
635.7	635.7	635.6	635.6	635.6	635.5	635.5	635.5	635.4	635.4
635.4	635.4	635.4	635.3	635.3	635.3	635.3	635.3	635.3	635.3
635.3	635.3	635.3	635.3	635.2	635.2	635.2	635.2	635.2	635.2

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635.2	635.2	635.2	635.2	635.2	635.2	635.2	635.2	635.2	635.2

PEAK OUTFLOW IS 8569. AT TIME 17.17 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8569.	5148.	1517.	1095.	218991.
CMS	243.	146.	43.	31.	6201.
INCHES		9.04	10.65	10.68	10.68
MM		229.50	270.54	271.19	271.19
AC-FT		2553.	3009.	3016.	3016.
THOUS CU M		3149.	3712.	3721.	3721.

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A9	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0700	.0500	.0600	610.0	620.0	1100.	.01600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	620.00	100.00	615.00	115.00	612.00	115.00	610.00	135.00	610.00
135.00	612.00	150.00	615.00	250.00	620.00				

STORAGE	0.00	.27	.53	.80	1.06	1.38	1.76	2.22	2.74	3.34
	4.03	4.97	6.20	7.70	9.49	11.55	13.89	16.52	19.42	22.60
OUTFLOW	0.00	25.00	76.82	146.38	230.89	337.54	467.19	623.13	808.15	1024.83
	1253.63	1528.77	1881.59	2320.18	2854.87	3496.15	4254.19	5138.84	6159.55	7325.49
STAGE	610.00	610.53	611.05	611.58	612.11	612.63	613.16	613.68	614.21	614.74
	615.26	615.79	616.32	616.84	617.37	617.89	618.42	618.95	619.47	620.00
FLOW	0.00	25.00	76.82	146.38	230.89	337.54	467.19	623.13	808.15	1024.83
	1253.63	1528.77	1881.59	2320.18	2854.87	3496.15	4254.19	5138.84	6159.55	7325.49

STATION A9, PLAN 1, RTIO 3

OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	11.	12.	13.	15.
17.	23.	36.	49.	61.	73.	85.	95.	104.	114.
122.	131.	139.	147.	156.	166.	176.	186.	196.	211.
227.	241.	254.	267.	284.	309.	346.	399.	472.	709.
1112.	1526.	1989.	2472.	2945.	3005.	2917.	3050.	3170.	3298.
3419.	3549.	3775.	4031.	4346.	4774.	5329.	6018.	6849.	7602.

8125.	8457.	8571.	8495.	8275.	7938.	7529.	7112.	6709.	6315.
5956.	5582.	5173.	4767.	4355.	3953.	3574.	3256.	2962.	2679.
2415.	2196.	2001.	1792.	1627.	1493.	1357.	1238.	1124.	1027.
933.	853.	779.	713.	654.	601.	554.	512.	474.	440.
409.	382.	357.	334.	314.	295.	279.	263.	249.	235.
222.	210.	198.	187.	176.	165.	156.	146.	138.	130.
122.	115.	108.	102.	96.	90.	85.	81.	76.	72.
69.	65.	62.	59.	56.	53.	50.	48.	46.	44.
42.	40.	38.	37.	35.	34.	32.	31.	30.	29.
28.	27.	26.	25.	25.	24.	23.	22.	22.	21.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
4.	5.	7.	8.	10.	10.	10.	10.	11.	11.
11.	12.	12.	13.	14.	15.	17.	19.	21.	23.
25.	26.	26.	26.	25.	24.	23.	22.	21.	20.
19.	18.	17.	15.	14.	13.	12.	11.	10.	9.
8.	7.	7.	6.	5.	5.	4.	4.	4.	3.
3.	3.	3.	2.	2.	2.	2.	2.	2.	2.
2.	2.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

610.0	610.0	610.0	610.0	610.0	610.1	610.1	610.1	610.1	610.1
610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.3	610.3
610.4	610.5	610.6	610.8	610.9	611.0	611.1	611.2	611.3	611.3
611.4	611.5	611.5	611.6	611.6	611.7	611.8	611.8	611.9	612.0
612.1	612.2	612.2	612.3	612.4	612.5	612.7	612.9	613.2	613.9
614.9	615.8	616.4	617.0	617.4	617.5	617.4	617.5	617.6	617.7
617.8	617.9	618.1	618.3	618.5	618.7	619.0	619.4	619.8	620.1
620.4	620.5	620.6	620.5	620.4	620.3	620.1	619.9	619.7	619.5
619.4	619.2	619.0	618.7	618.5	618.2	617.9	617.7	617.5	617.2
616.9	616.7	616.5	616.2	615.9	615.7	615.5	615.2	615.0	614.7
614.5	614.3	614.1	613.9	613.8	613.6	613.5	613.3	613.2	613.0
612.9	612.8	612.7	612.6	612.5	612.4	612.3	612.3	612.2	612.1
612.1	612.0	611.9	611.8	611.8	611.7	611.6	611.6	611.5	611.5
611.4	611.3	611.3	611.2	611.2	611.2	611.1	611.1	611.0	611.0
611.0	610.9	610.9	610.9	610.8	610.8	610.8	610.8	610.7	610.7
610.7	610.7	610.7	610.6	610.6	610.6	610.6	610.6	610.6	610.6
610.6	610.5	610.5	610.5	610.5	610.5	610.5	610.5	610.5	610.4

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8571.	5216.	1600.	1154.	230867.
CMS	243.	148.	45.	33.	6537.
INCHES		9.15	11.23	11.26	11.26
MM		232.53	285.27	285.90	285.90

AC-FT	2586.	3173.	3180.	3180.
THOUS CU M	3190.	3914.	3922.	3922.

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MAXIMUM STORAGE = 26.

MAXIMUM STAGE IS 620.6

STATION A9, PLAN 2, RTIO 3

OUTFLOW

1. 1. 1. 2. 2. 3. 3. 4. 4. 5.

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5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	11.	12.	13.	15.
17.	23.	36.	49.	61.	73.	85.	95.	104.	114.
122.	131.	139.	147.	156.	166.	176.	186.	196.	211.
227.	241.	254.	267.	284.	309.	346.	399.	472.	594.
811.	1136.	1459.	1760.	2044.	2304.	2553.	2827.	3083.	3284.
3480.	3666.	3852.	4075.	4386.	4850.	5465.	6177.	6930.	7603.
8122.	8445.	8566.	8498.	8281.	7946.	7537.	7123.	6722.	6321.
5919.	5512.	5102.	4691.	4305.	3913.	3487.	3085.	2703.	2402.
2128.	1846.	1602.	1390.	1206.	1042.	902.	788.	712.	648.
590.	542.	491.	458.	432.	407.	385.	364.	345.	327.
311.	295.	281.	267.	254.	242.	231.	220.	209.	200.
192.	186.	178.	170.	162.	154.	146.	138.	130.	123.
115.	108.	101.	94.	88.	82.	77.	72.	66.	61.
56.	52.	49.	45.	43.	40.	38.	36.	34.	33.
32.	30.	29.	28.	28.	27.	26.	26.	25.	25.
24.	24.	24.	23.	23.	23.	22.	22.	22.	22.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	2.	2.	2.
3.	4.	5.	6.	7.	8.	8.	9.	10.	11.
11.	12.	13.	13.	14.	16.	17.	19.	22.	23.
25.	26.	26.	26.	25.	24.	23.	22.	21.	20.
19.	18.	16.	15.	14.	13.	12.	10.	9.	8.
7.	6.	5.	4.	4.	3.	3.	3.	2.	2.
2.	2.	2.	2.	2.	2.	2.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

610.0	610.0	610.0	610.0	610.0	610.1	610.1	610.1	610.1	610.1
610.1	610.1	610.1	610.1	610.1	610.1	610.1	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2
610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.2	610.3	610.3
610.4	610.5	610.6	610.8	610.9	611.0	611.1	611.2	611.3	611.3
611.4	611.5	611.5	611.6	611.6	611.7	611.8	611.8	611.9	612.0
612.1	612.2	612.2	612.3	612.4	612.5	612.7	612.9	613.2	613.6
614.2	615.0	615.7	616.1	616.5	616.8	617.1	617.3	617.6	617.7
617.9	618.0	618.1	618.3	618.5	618.8	619.1	619.5	619.8	620.1
620.4	620.5	620.6	620.5	620.4	620.3	620.1	619.9	619.7	619.5
619.3	619.1	618.9	618.7	618.5	618.2	617.9	617.6	617.2	616.9
616.6	616.3	615.9	615.5	615.2	614.8	614.4	614.2	613.9	613.8
613.6	613.4	613.2	613.1	613.0	612.9	612.8	612.7	612.7	612.6
612.5	612.4	612.4	612.3	612.2	612.2	612.1	612.0	612.0	611.9
611.9	611.8	611.8	611.7	611.7	611.6	611.6	611.5	611.5	611.4
611.3	611.3	611.2	611.2	611.1	611.1	611.1	611.0	610.9	610.9

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 610.8     610.8     610.8     610.7     610.7     610.7     610.7     610.6     610.6     610.6
 610.6     610.6     610.6     610.6     610.6     610.5     610.5     610.5     610.5     610.5
 610.5     610.5     610.5     610.5     610.5     610.5     610.5     610.5     610.5     610.5

                       PEAK    6-HOUR   24-HOUR   72-HOUR   TOTAL VOLUME
              CFS      8566.    5147.     1517.     1095.      218975.
              CMS       243.     146.       43.       31.        6201.
           INCHES                9.03     10.65     10.68        10.68
               MM              229.47    270.54    271.17       271.17
            AC-FT               2552.     3009.     3016.        3016.
        THOUS CU M              3148.     3712.     3720.        3720.

                         MAXIMUM STORAGE =        26.

MAXIMUM STAGE IS     620.6

     **********      **********      **********      **********      **********

                            HYDROGRAPH ROUTING

           CHANNEL ROUTING -MOD PULS- NJ 513 BRIDGE

                  ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                    A10       1       0       0       0       1       1       0       0

                             ALL PLANS HAVE SAME
                                 ROUTING DATA
             QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
               0.0   0.000    0.00       1       1       0       0               0

                  NSTPS   NSTOL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                      1       0       0   0.000   0.000   0.000     -1.       0

NORMAL DEPTH CHANNEL ROUTING
----------------------------

      QN(1)   QN(2)   QN(3)   ELNVT   ELMAX   PLNTH     SEL
      .0300   .0400   .0300   609.0   620.0     60.  .01600

      CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
         0.00  620.00  120.00  617.00  240.00  614.00  240.00  609.00  253.00  609.00
       253.00  614.00  353.00  614.00  353.00  620.00

 STORAGE       0.00         .01         .02         .03         .04         .05         .06         .07         .08         .12
                .23         .35         .50         .66         .84        1.04        1.25        1.49        1.74        2.02

 OUTFLOW       0.00       23.27       70.11      131.27      202.64      281.73      366.85      456.80      550.70      703.74
            1245.22     2148.94     3410.64     5042.65     7062.19     9418.26    12340.72    15639.65    19405.17    23657.32

 STAGE       609.00      609.58      610.16      610.74      611.32      611.89      612.47      613.05      613.63      614.21
```

	614.72	615.37	615.95	616.52	617.11	617.68	618.26	618.84	619.42	620.00
FLOW	0.00	23.27	70.11	131.27	202.64	281.73	366.85	456.88	550.70	703.74
	1245.22	2148.94	3410.64	5042.65	7062.18	9488.26	12340.72	15639.65	19405.17	23657.32

STATION A10, PLAN 1, RTIO 3

OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	11.	12.	13.	15.
17.	22.	36.	49.	61.	73.	84.	94.	104.	113.

91

122.	131.	139.	147.	156.	165.	176.	186.	196.	210.
227.	241.	254.	267.	284.	309.	346.	398.	472.	702.
1107.	1522.	1985.	2468.	2941.	3008.	2916.	3049.	3169.	3297.
3418.	3568.	3773.	4029.	4343.	4771.	5324.	6013.	6843.	7599.
8122.	8456.	8570.	8496.	8276.	7941.	7531.	7115.	6712.	6318.
5958.	5585.	5175.	4770.	4358.	3956.	3576.	3258.	2964.	2681.
2417.	2198.	2003.	1794.	1628.	1495.	1359.	1239.	1126.	1027.
935.	853.	780.	713.	656.	602.	556.	511.	475.	439.
411.	381.	358.	334.	315.	295.	279.	262.	249.	234.
223.	209.	199.	186.	176.	165.	156.	146.	139.	129.
123.	114.	108.	101.	96.	90.	86.	80.	77.	72.
69.	65.	62.	58.	56.	53.	51.	48.	46.	44.
42.	40.	38.	36.	35.	34.	33.	31.	30.	29.
28.	27.	26.	25.	25.	24.	23.	22.	22.	21.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

609.0	609.0	609.0	609.0	609.1	609.1	609.1	609.1	609.1	609.1
609.1	609.1	609.1	609.1	609.2	609.2	609.2	609.2	609.2	609.2
609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2
609.2	609.2	609.2	609.2	609.2	609.2	609.3	609.3	609.3	609.3
609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.4
609.4	609.6	609.7	609.9	610.0	610.2	610.3	610.4	610.5	610.6
610.7	610.7	610.8	610.9	610.9	611.0	611.1	611.2	611.3	611.4
611.5	611.6	611.7	611.8	611.9	612.1	612.3	612.7	613.1	614.2
614.6	615.0	615.3	615.5	615.7	615.8	615.7	615.8	615.8	615.9
615.9	616.0	616.1	616.2	616.3	616.4	616.6	616.8	617.0	617.2
617.4	617.4	617.5	617.4	617.4	617.3	617.2	617.1	617.0	616.9
616.8	616.7	616.6	616.4	616.3	616.1	616.0	615.9	615.7	615.6
615.5	615.4	615.3	615.1	615.0	614.9	614.9	614.8	614.7	614.6
614.5	614.4	614.3	614.2	614.0	613.8	613.7	613.4	613.2	612.9
612.8	612.6	612.4	612.2	612.1	612.0	611.9	611.8	611.7	611.5
611.5	611.4	611.3	611.2	611.1	611.0	610.9	610.9	610.8	610.7
610.7	610.6	610.5	610.5	610.4	610.3	610.3	610.3	610.2	610.2
610.1	610.1	610.1	610.0	610.0	609.9	609.9	609.9	609.9	609.8
609.9	609.8	609.8	609.7	609.7	609.7	609.7	609.7	609.7	609.6
609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.5	609.5

PEAK 6-HOUR 24-HOUR 72-HOUR TOTAL VOLUME

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CFS	8570.	5216.	1600.	1154.	230866.
CMS	243.	148.	45.	33.	6537.
INCHES		9.15	11.23	11.26	11.26
MM		232.53	285.27	285.90	285.90
AC-FT		2586.	3173.	3180.	3180.
THOUS CU M		3190.	3914.	3922.	3922.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 617.5

95 ✓

STATION A10, PLAN 2, RTIO 3

OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	11.	11.	11.	11.	12.	13.	15.
17.	22.	36.	49.	61.	73.	84.	94.	104.	113.
122.	131.	139.	147.	156.	165.	176.	186.	196.	210.
227.	241.	254.	267.	284.	309.	346.	398.	472.	592.
806.	1132.	1456.	1757.	2041.	2302.	2551.	2825.	3081.	3283.
3478.	3665.	3851.	4074.	4383.	4846.	5461.	6172.	6925.	7600.
8119.	8444.	8565.	8499.	8282.	7948.	7540.	7125.	6724.	6324.
5921.	5515.	5104.	4695.	4307.	3917.	3489.	3089.	2706.	2405.
2130.	1850.	1604.	1392.	1207.	1046.	903.	790.	712.	651.
590.	544.	490.	459.	431.	408.	384.	365.	344.	328.
310.	296.	280.	268.	253.	243.	230.	221.	209.	200.
192.	186.	178.	171.	162.	155.	146.	139.	130.	123.
115.	108.	101.	95.	88.	83.	76.	72.	66.	61.
56.	52.	48.	46.	42.	40.	38.	36.	34.	33.
31.	31.	29.	29.	28.	27.	26.	26.	25.	25.
24.	24.	24.	23.	23.	23.	22.	22.	22.	22.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

609.0	609.0	609.0	609.0	609.1	609.1	609.1	609.1	609.1	609.1
609.1	609.1	609.1	609.1	609.2	609.2	609.2	609.2	609.2	609.2
609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2	609.2
609.2	609.2	609.2	609.2	609.2	609.2	609.3	609.3	609.3	609.3
609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.3	609.4
609.4	609.6	609.7	609.9	610.0	610.2	610.3	610.4	610.5	610.6
610.7	610.7	610.8	610.9	610.9	611.0	611.1	611.2	611.3	611.4
611.5	611.6	611.7	611.8	611.9	612.1	612.3	612.7	613.1	613.8
614.3	614.7	614.9	615.1	615.3	615.4	615.6	615.7	615.8	615.9
616.0	616.0	616.1	616.2	616.3	616.5	616.6	616.9	617.1	617.2
617.4	617.4	617.5	617.4	617.4	617.3	617.2	617.1	617.0	616.9
616.8	616.7	616.5	616.4	616.3	616.1	616.0	615.8	615.6	615.5
615.4	615.2	615.0	614.9	614.7	614.6	614.4	614.3	614.2	614.0

96

613.8	613.6	613.3	613.1	612.9	612.7	612.6	612.5	612.3	612.2
612.1	612.0	611.9	611.8	611.7	611.6	611.5	611.4	611.4	611.3
611.2	611.2	611.1	611.1	611.0	610.9	610.9	610.8	610.7	610.7
610.6	610.5	610.4	610.4	610.3	610.3	610.2	610.2	610.1	610.0
610.0	609.9	609.9	609.9	609.8	609.8	609.8	609.7	609.7	609.7
609.7	609.7	609.7	609.6	609.6	609.6	609.6	609.6	609.6	609.6
609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.6	609.5	609.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8565.	5147.	1517.	1095.	218974.
CMS	243.	146.	43.	31.	6201.
INCHES		9.03	10.65	10.68	10.68
MM		229.47	270.54	271.17	271.17
AC-FT		2552.	3009.	3016.	3016.
THOUS CU M		3148.	3712.	3720.	3720.

MAXIMUM STORAGE = 1.

MAXIMUM STAGE IS 617.5

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A11	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0300	.0500	.0300	606.0	618.0	200.	.01600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

0.00	618.00	20.00	616.00	40.00	614.00	80.00	606.00	105.00	606.00
145.00	614.00	165.00	616.00	185.00	618.00				

STORAGE	0.00	.08	.18	.30	.44	.59	.76	.96	1.17	1.39
	1.64	1.91	2.19	2.49	2.83	3.20	3.61	4.05	4.53	5.05

97

OUTFLOW	0.00	45.85	153.47	318.85	544.47	834.13	1192.03	1622.48	2129.83	2718.36
	3392.30	4155.79	5012.93	6044.09	7350.17	8814.65	10462.83	12316.26	14394.39	16715.29
STAGE	606.00	606.63	607.26	607.89	608.53	609.16	609.79	610.42	611.05	611.68
	612.32	612.95	613.58	614.21	614.84	615.47	616.11	616.74	617.37	618.00
FLOW	0.00	45.85	153.47	318.85	544.47	834.13	1192.03	1622.48	2129.83	2718.36
	3392.30	4155.79	5012.93	6044.09	7350.17	8814.65	10462.83	12316.26	14394.39	16715.29

STATION A11, PLAN 1, RTIO 3

OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.

100 ✓

8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	12.	13.	14.
17.	21.	34.	48.	60.	72.	84.	94.	104.	113.
122.	130.	138.	146.	155.	165.	175.	185.	196.	210.
226.	240.	253.	266.	283.	307.	344.	396.	468.	688.
1092.	1510.	1969.	2456.	2928.	3017.	2913.	3045.	3166.	3293.
3415.	3563.	3768.	4022.	4336.	4758.	5312.	5996.	6829.	7585.
8116.	8450.	8572.	8497.	8283.	7946.	7541.	7121.	6720.	6324.
5965.	5593.	5185.	4780.	4368.	3965.	3566.	3265.	2973.	2688.
2426.	2202.	2010.	1800.	1632.	1499.	1363.	1242.	1131.	1030.
939.	855.	784.	715.	658.	603.	557.	513.	476.	441.
411.	383.	358.	335.	315.	297.	279.	264.	249.	236.
223.	211.	199.	187.	176.	166.	156.	147.	139.	130.
122.	115.	108.	102.	96.	91.	86.	81.	76.	73.
69.	65.	62.	59.	56.	53.	50.	48.	46.	44.
42.	40.	38.	37.	35.	34.	33.	31.	30.	29.
28.	27.	26.	25.	25.	24.	23.	23.	22.	21.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
1.	1.	1.	1.	1.	2.	1.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

606.0	606.0	606.0	606.0	606.0	606.0	606.0	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.2	606.2	606.2	606.2
606.2	606.3	606.5	606.6	606.7	606.8	606.9	606.9	607.0	607.0
607.1	607.1	607.2	607.2	607.3	607.3	607.3	607.4	607.4	607.5
607.5	607.6	607.6	607.7	607.8	607.9	608.0	608.1	608.3	608.8
607.6	610.3	610.9	611.4	611.9	612.0	611.9	612.0	612.1	612.2
612.3	612.5	612.6	612.8	613.1	613.4	613.8	614.2	614.6	614.9
615.2	615.3	615.4	615.3	615.2	615.1	614.9	614.7	614.5	614.3
614.2	613.7	613.7	613.4	613.1	612.8	612.5	612.2	611.9	611.7
611.4	611.1	610.9	610.6	610.4	610.2	610.0	609.9	609.7	609.5
609.3	609.2	609.0	608.9	608.8	608.7	608.6	608.4	608.3	608.2
608.2	608.1	608.0	607.9	607.9	607.8	607.7	607.7	607.6	607.6
607.5	607.5	607.4	607.4	607.4	607.3	607.3	607.2	607.2	607.1
607.1	607.0	607.0	607.0	606.9	606.5	606.9	606.8	606.8	606.8
606.8	606.7	606.7	606.7	606.7	606.7	606.7	606.6	606.6	606.6

606.6	606.6	606.5	606.5	606.5	606.5	606.4	606.4	606.4	606.4
606.4	606.4	606.4	606.3	606.3	606.3	606.3	606.3	606.3	606.3

101 ✓

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8572.	5216.	1600.	1154.	230863.
CMS	243.	148.	45.	33.	6537.
INCHES		9.15	11.23	11.26	11.26
MM		232.52	285.27	285.89	285.89
AC-FT		2586.	3173.	3180.	3180.
THOUS CU M		3190.	3914.	3922.	3922.

MAXIMUM STORAGE = 3.

MAXIMUM STAGE IS 615.4

STATION A11, PLAN 2, RTIO 3

OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	12.	13.	14.
17.	21.	34.	48.	60.	72.	84.	94.	104.	113.
122.	130.	138.	146.	155.	165.	175.	185.	196.	210.
226.	240.	253.	266.	283.	307.	344.	396.	468.	586.
796.	1119.	1447.	1747.	2034.	2294.	2545.	2816.	3076.	3277.
3473.	3660.	3846.	4067.	4375.	4832.	5447.	6156.	6913.	7587.
8112.	8439.	8566.	8501.	8288.	7959.	7548.	7132.	6733.	6330.
5930.	5524.	5113.	4705.	4316.	3927.	3500.	3099.	2716.	2411.
2139.	1858.	1610.	1399.	1212.	1052.	907.	795.	714.	653.
592.	545.	494.	459.	434.	408.	386.	365.	346.	328.
312.	296.	282.	268.	255.	243.	232.	221.	210.	200.
193.	186.	179.	171.	163.	155.	147.	139.	131.	123.
116.	108.	102.	95.	89.	83.	77.	72.	67.	61.
57.	52.	49.	46.	43.	40.	38.	36.	35.	33.
32.	31.	30.	29.	28.	27.	26.	26.	25.	25.
24.	24.	24.	23.	23.	23.	22.	22.	22.	22.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
2.	2.	2.	2.	2.	2.	2.	2.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

606.0	606.0	606.0	606.0	606.0	606.0	606.0	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1	606.1
606.1	606.1	606.1	606.1	606.1	606.1	606.2	606.2	606.2	606.2
606.2	606.3	606.5	606.6	606.7	606.8	606.9	606.9	607.0	607.0
607.1	607.1	607.2	607.2	607.3	607.3	607.3	607.4	607.4	607.5
607.5	607.6	607.6	607.7	607.8	607.9	608.0	608.1	608.3	608.6
609.1	609.7	610.2	610.6	610.9	611.2	611.5	611.8	612.0	612.2

105 ✓

612.4	612.5	612.7	612.9	613.1	613.4	613.8	614.3	614.6	614.9
615.2	615.3	615.4	615.3	615.2	615.1	614.9	614.7	614.5	614.3
614.1	613.9	613.6	613.4	613.1	612.8	612.4	612.0	611.7	611.4
611.1	610.7	610.4	610.1	609.8	609.5	609.3	609.1	608.9	608.8
608.6	608.5	608.4	608.3	608.2	608.1	608.1	608.0	608.0	607.9
607.9	607.8	607.8	607.7	607.7	607.6	607.6	607.5	607.5	607.4
607.4	607.4	607.4	607.3	607.3	607.3	607.2	607.2	607.1	607.1
607.0	607.0	607.0	606.9	606.9	606.8	606.8	606.8	606.8	606.7
606.7	606.7	606.6	606.6	606.6	606.6	606.5	606.5	606.5	606.5
606.4	606.4	606.4	606.4	606.4	606.4	606.4	606.4	606.3	606.3
606.3	606.3	606.3	606.3	606.3	606.3	606.3	606.3	606.3	606.3

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8566.	5147.	1517.	1095.	218971.
CMS	243.	146.	43.	31.	6201.
INCHES		9.03	10.65	10.68	10.68
MM		229.46	270.54	271.17	271.17
AC-FT		2552.	3009.	3016.	3016.
THOUS CU M		3148.	3712.	3720.	3720.

MAXIMUM STORAGE = 3.

MAXIMUM STAGE IS 615.4

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HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- MIGGEN RD BRIDGE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A12	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP		LSTR
0.0	0.000	0.00	1	1	0	0		0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0160	.0400	.0160	605.0	618.0	37.	.01600

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 618.00 70.00 615.00 180.00 612.00 180.00 605.00 211.00 605.00
211.00 612.00 400.00 612.00 400.00 618.00

STORAGE	0.00	.02	.04	.05	.07	.09	.11	.13	.14	.16
	.18	.29	.43	.58	.75	.93	1.12	1.32	1.54	1.76
OUTFLOW	0.00	75.40	232.86	445.72	701.81	993.28	1314.49	1661.12	2029.79	2417.75
	2822.73	4075.71	7040.44	11378.37	17014.55	23930.22	32129.30	41627.29	52446.32	64612.61
STAGE	605.00	605.68	606.37	607.05	607.74	608.42	609.11	609.79	610.47	611.16
	611.84	612.53	613.21	613.89	614.58	615.26	615.95	616.63	617.32	618.00
FLOW	0.00	75.40	232.86	445.72	701.81	993.28	1314.49	1661.12	2029.79	2417.75
	2822.73	4075.71	7040.44	11378.37	17014.55	23930.22	32129.30	41627.29	52446.32	64612.61

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STATION A12, PLAN 1, RTIO 3

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OUTFLOW

1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	12.	13.	14.
16.	21.	33.	47.	60.	72.	84.	94.	103.	113.
122.	130.	138.	146.	155.	165.	175.	185.	195.	209.
226.	240.	253.	266.	283.	307.	343.	395.	467.	686.
1090.	1508.	1967.	2454.	2926.	3018.	2913.	3043.	3167.	3291.
3416.	3561.	3768.	4019.	4336.	4755.	5311.	5992.	6827.	7583.
8115.	8449.	8573.	8497.	8284.	7946.	7542.	7122.	6723.	6324.
5967.	5594.	5187.	4780.	4370.	3966.	3589.	3266.	2976.	2687.
2428.	2202.	2012.	1799.	1634.	1499.	1365.	1241.	1132.	1030.
940.	856.	785.	715.	659.	603.	558.	513.	477.	441.
412.	383.	359.	335.	316.	296.	280.	264.	250.	236.
224.	210.	199.	187.	177.	166.	157.	147.	139.	130.
123.	115.	109.	102.	97.	91.	86.	81.	77.	73.
69.	65.	62.	59.	56.	53.	51.	48.	46.	44.
42.	40.	39.	37.	35.	34.	33.	31.	30.	29.
28.	27.	26.	25.	25.	24.	23.	23.	22.	21.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0
605.0	605.0	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.2	605.3	605.4	605.5	605.6	605.7	605.8	605.8	605.8
605.9	605.9	606.0	606.0	606.0	606.1	606.1	606.2	606.2	606.3
606.3	606.4	606.4	606.5	606.5	606.6	606.7	606.9	607.1	607.7
608.6	609.5	610.4	611.2	611.9	611.9	611.9	612.0	612.0	612.1
612.2	612.2	612.4	612.5	612.6	612.7	612.8	613.0	613.2	613.3
613.4	613.4	613.5	613.4	613.4	613.4	613.3	613.2	613.1	613.0
613.0	612.9	612.8	612.7	612.6	612.5	612.3	612.1	611.9	611.6
611.2	610.8	610.4	610.0	609.7	609.5	609.2	608.9	608.7	608.5
608.3	608.1	607.9	607.8	607.6	607.5	607.4	607.2	607.1	607.0

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606.9	606.8	606.8	606.7	606.6	606.6	606.5	606.5	606.4	606.4
606.3	606.3	606.2	606.2	606.1	606.1	606.0	606.0	606.0	605.9
605.9	605.9	605.8	605.8	605.8	605.8	605.7	605.7	605.7	605.7
605.6	605.6	605.6	605.5	605.5	605.5	605.5	605.4	605.4	605.4
605.4	605.4	605.3	605.3	605.3	605.3	605.3	605.3	605.3	605.3
605.3	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8573.	5216.	1600.	1154.	230863.
CMS	243.	148.	45.	33.	6537.
INCHES		9.15	11.23	11.26	11.26
MM		232.52	285.27	285.89	285.89
AC-FT		2586.	3173.	3180.	3180.
THOUS CU M		3190.	3914.	3922.	3922.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 613.5

STATION A12, PLAN 2, RTIO 3

				OUTFLOW					
1.	1.	1.	2.	2.	3.	3.	4.	4.	5.
5.	5.	6.	6.	6.	7.	7.	7.	7.	8.
8.	8.	8.	8.	9.	9.	9.	9.	9.	9.
9.	10.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	12.	13.	14.
16.	21.	33.	47.	60.	72.	84.	94.	103.	113.
122.	130.	138.	146.	155.	165.	175.	185.	195.	209.
226.	240.	253.	266.	283.	307.	343.	395.	467.	585.
795.	1118.	1446.	1746.	2033.	2293.	2544.	2815.	3074.	3277.
3471.	3660.	3844.	4067.	4373.	4831.	5445.	6154.	6910.	7587.
8110.	8439.	8565.	8502.	8288.	7956.	7549.	7134.	6733.	6333.
5931.	5526.	5114.	4707.	4316.	3930.	3503.	3101.	2718.	2412.
2141.	1858.	1612.	1400.	1214.	1052.	908.	794.	715.	653.
593.	545.	494.	457.	434.	408.	386.	364.	346.	328.
312.	296.	282.	267.	256.	242.	232.	220.	211.	200.
193.	186.	179.	171.	163.	154.	147.	139.	132.	123.
116.	108.	102.	95.	89.	83.	77.	72.	67.	61.
57.	52.	49.	46.	43.	40.	38.	36.	35.	33.
32.	31.	30.	29.	28.	27.	26.	26.	25.	25.
24.	24.	24.	23.	23.	23.	22.	22.	22.	22.
				STOR					
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
				STAGE					
605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0	605.0
605.0	605.0	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1
605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1	605.1

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605.1	605.2	605.3	605.4	605.5	605.6	605.7	605.8	605.8	605.8
605.9	605.9	606.0	606.0	606.0	606.1	606.1	606.2	606.2	606.3
606.3	605.4	606.4	606.5	606.5	606.6	606.7	606.9	607.1	607.4
608.0	608.7	609.4	609.9	610.5	610.9	611.4	611.8	612.0	612.1
612.2	612.3	612.4	612.5	612.6	612.7	612.8	613.0	613.2	613.3
613.4	613.4	613.5	613.4	613.4	613.4	613.3	613.2	613.1	613.0
613.0	612.9	612.8	612.7	612.6	612.4	612.2	612.0	611.7	611.1
610.7	610.2	609.7	609.3	608.9	608.5	608.2	608.0	607.8	607.6
607.4	607.3	607.2	607.1	607.0	606.9	606.9	606.8	606.7	606.7
606.6	606.6	606.5	606.5	606.4	606.4	606.4	606.3	606.3	606.2
606.2	606.2	606.1	606.1	606.1	606.0	606.0	606.0	605.9	605.9
605.9	605.8	605.8	605.8	605.7	605.7	605.7	605.7	605.6	605.6
605.5	605.5	605.4	605.4	605.4	605.4	605.3	605.3	605.3	605.3
605.3	605.3	605.3	605.3	605.3	605.2	605.2	605.2	605.2	605.2
605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2	605.2

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8565.	5147.	1517.	1095.	218971.
CMS	243.	146.	43.	31.	6201.
INCHES		9.03	10.65	10.68	10.68
MM		229.46	270.54	271.16	271.16
AC-FT		2552.	3009.	3016.	3016.
THOUS CU M		3148.	3712.	3720.	3720.

MAXIMUM STORAGE = 0.

MAXIMUM STAGE IS 613.5

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

CHANNEL ROUTING -MOD PULS- REACH 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
A13	1	0	0	0	1	1	0	0

ALL PLANS HAVE SAME
ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0600	.0500	.0600	560.0	572.0	1200.	.01600

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CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 572.00 50.00 567.00 100.00 562.00 100.00 560.00 118.00 560.00
118.00 562.00 168.00 567.00 218.00 572.00

STORAGE	0.00	.31	.63	.94	1.33	1.94	2.76	3.81	5.07	6.56
	8.26	10.19	12.33	14.70	17.28	20.09	23.11	26.35	29.82	33.50
OUTFLOW	0.00	30.15	91.75	173.31	281.70	432.60	639.79	915.29	1269.79	1713.15
	2254.62	2902.98	3666.62	4553.61	5571.77	6728.65	8031.60	9487.79	11104.22	12887.72
STAGE	560.00	560.63	561.26	561.89	562.53	563.16	563.79	564.42	565.05	565.68
	566.32	566.95	567.58	568.21	568.84	569.47	570.11	570.74	571.37	572.00
FLOW	0.00	30.15	91.75	173.31	281.70	432.60	639.79	915.29	1269.79	1713.15
	2254.62	2902.98	3666.62	4553.61	5571.77	6728.65	8031.60	9487.79	11104.22	12887.72

STATION A13, PLAN 1, RTIO 3

OUTFLOW

1.	1.	1.	1.	2.	2.	3.	3.	4.	4.
5.	5.	5.	6.	6.	6.	7.	7.	7.	7.
8.	8.	8.	8.	8.	9.	9.	9.	9.	9.
9.	9.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	11.	12.	13.
15.	18.	25.	41.	56.	67.	79.	90.	101.	110.
119.	128.	136.	144.	153.	162.	172.	183.	193.	205.
221.	236.	250.	263.	278.	300.	332.	379.	445.	612.
969.	1407.	1855.	2345.	2827.	3031.	2938.	2995.	3151.	3262.
3392.	3529.	3722.	3969.	4270.	4669.	5201.	5863.	6671.	7469.
8038.	8407.	8564.	8520.	8324.	8009.	7613.	7192.	6788.	6396.
6026.	5663.	5263.	4854.	4448.	4045.	3660.	3330.	3033.	2750.
2481.	2249.	2054.	1851.	1668.	1531.	1397.	1271.	1160.	1056.
962.	878.	803.	734.	673.	619.	570.	526.	487.	452.
420.	391.	365.	342.	321.	302.	284.	268.	253.	239.
226.	214.	202.	190.	179.	169.	159.	150.	141.	133.
125.	117.	110.	104.	98.	92.	88.	83.	78.	74.
70.	67.	63.	60.	57.	54.	52.	49.	47.	45.
43.	41.	39.	37.	36.	34.	33.	32.	31.	30.
25.	28.	27.	26.	25.	25.	24.	23.	22.	22.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	3.
4.	6.	7.	9.	10.	11.	10.	10.	11.	11.
12.	12.	12.	13.	14.	15.	16.	18.	20.	22.
23.	24.	24.	24.	24.	23.	22.	21.	20.	19.
18.	18.	16.	15.	14.	13.	12.	11.	11.	10.
9.	8.	8.	7.	6.	6.	5.	5.	5.	4.
4.	4.	3.	3.	3.	3.	2.	2.	2.	2.
2.	2.	2.	2.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

560.0	560.0	560.0	560.0	560.0	560.1	560.1	560.1	560.1	560.1
560.1	560.1	560.1	560.1	560.1	560.1	560.1	560.1	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.3	560.3
560.3	560.4	560.5	560.7	560.9	561.0	561.1	561.2	561.3	561.4
561.5	561.5	561.6	561.7	561.7	561.8	561.9	561.9	562.0	562.1
562.2	562.3	562.3	562.4	562.5	562.6	562.7	562.9	563.2	563.7
564.5	565.2	565.8	566.4	566.9	567.1	567.0	567.0	567.2	567.2
567.4	567.5	567.6	567.8	568.0	568.3	568.6	569.0	569.4	569.8

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570.1	570.3	570.3	570.3	570.2	570.1	569.9	569.7	569.5	569.3
569.1	568.9	568.7	568.4	568.1	567.8	567.6	567.3	567.1	566.8
566.5	566.3	566.1	565.8	565.6	565.4	565.2	565.1	564.9	564.7
564.5	564.3	564.2	564.0	563.9	563.7	563.6	563.4	563.3	563.2
563.1	563.0	562.9	562.8	562.7	562.6	562.5	562.4	562.4	562.3
562.2	562.1	562.1	562.0	561.9	561.9	561.8	561.7	561.6	561.6
561.5	561.5	561.4	561.4	561.3	561.3	561.2	561.2	561.1	561.1
561.0	561.0	561.0	560.9	560.9	560.9	560.9	560.8	560.8	560.8
560.8	560.7	560.7	560.7	560.7	560.7	560.7	560.6	560.6	560.6
560.6	560.6	560.6	560.5	560.5	560.5	560.5	560.5	560.5	560.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8564.	5214.	1600.	1154.	230847.
CMS	242.	148.	45.	33.	6537.
INCHES		9.15	11.23	11.25	11.25
MM		232.45	285.26	285.87	285.87
AC-FT		2586.	3173.	3180.	3180.
THOUS CU M		3189.	3914.	3922.	3922.

MAXIMUM STORAGE = 24.

MAXIMUM STAGE IS 570.3

STATION A13, PLAN 2, RTIO 3

OUTFLOW

1.	1.	1.	1.	2.	2.	3.	3.	4.	4.
5.	5.	5.	6.	6.	6.	7.	7.	7.	7.
8.	8.	8.	8.	8.	9.	9.	9.	9.	9.
9.	9.	10.	10.	10.	10.	10.	10.	10.	10.
10.	10.	10.	10.	11.	11.	11.	11.	12.	13.
15.	18.	25.	41.	56.	67.	79.	90.	101.	110.
119.	128.	136.	144.	153.	162.	172.	183.	193.	205.
221.	236.	250.	263.	278.	300.	332.	379.	445.	548.
729.	1024.	1366.	1676.	1968.	2235.	2491.	2755.	3022.	3240.
3430.	3622.	3809.	4020.	4306.	4734.	5324.	6024.	6776.	7483.
8030.	8400.	8554.	8523.	8330.	8016.	7622.	7202.	6800.	6404.
6001.	5597.	5191.	4781.	4390.	4005.	3590.	3181.	2797.	2472.
2199.	1925.	1665.	1450.	1257.	1093.	944.	824.	735.	669.
610.	558.	509.	468.	441.	416.	392.	371.	351.	333.
316.	301.	286.	271.	258.	246.	234.	224.	213.	203.
195.	188.	181.	173.	165.	157.	149.	141.	133.	126.
118.	111.	104.	97.	91.	85.	79.	74.	69.	63.
58.	54.	50.	47.	44.	41.	39.	37.	35.	34.
32.	31.	30.	29.	28.	28.	27.	26.	26.	25.
25.	24.	24.	24.	23.	23.	23.	22.	22.	22.

STOR

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	2.	2.	2.	2.
3.	4.	5.	6.	7.	8.	9.	10.	11.	11.
12.	12.	13.	13.	14.	15.	17.	18.	20.	22.
23.	24.	24.	24.	24.	23.	22.	21.	20.	19.
18.	17.	16.	15.	14.	13.	12.	11.	10.	9.
8.	7.	6.	6.	5.	4.	4.	3.	3.	3.
3.	2.	2.	2.	2.	2.	2.	2.	2.	2.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

STAGE

560.0	560.0	560.0	560.0	560.0	560.1	560.1	560.1	560.1	560.1

123

560.1	560.1	560.1	560.1	560.1	560.1	560.1	560.1	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2
560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.2	560.3	560.3
560.3	560.4	560.5	560.7	560.9	561.0	561.1	561.2	561.3	561.4
561.5	561.5	561.6	561.7	561.7	561.8	561.9	561.9	562.0	562.1
562.2	562.3	562.3	562.4	562.5	562.6	562.7	562.9	563.2	563.5
564.0	564.6	565.2	565.6	566.0	566.3	566.5	566.8	567.0	567.2
567.4	567.5	567.7	567.8	568.0	568.3	568.7	569.1	569.5	569.8
570.1	570.3	570.3	570.3	570.2	570.1	569.9	569.7	569.5	569.3
569.1	568.9	568.6	568.4	568.1	567.8	567.5	567.2	566.8	566.5
566.3	565.9	565.6	565.3	565.0	564.7	564.5	564.2	564.0	563.9
563.7	563.5	563.4	563.3	563.2	563.1	563.0	562.9	562.8	562.7
562.7	562.6	562.5	562.5	562.4	562.3	562.3	562.2	562.1	562.1
562.0	562.0	561.9	561.9	561.8	561.8	561.7	561.6	561.6	561.5
561.5	561.4	561.4	561.3	561.3	561.2	561.1	561.1	561.0	561.0
560.9	560.9	560.8	560.8	560.8	560.7	560.7	560.7	560.7	560.7
560.7	560.5	560.6	560.6	560.6	560.6	560.6	560.5	560.5	560.5
560.5	560.5	560.5	560.5	560.5	560.5	560.5	560.5	560.5	560.5

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	8554.	5146.	1517.	1095.	218955.
CMS	242.	146.	43.	31.	6200.
INCHES		9.03	10.65	10.67	10.67
MM		229.40	270.54	271.14	271.14
AC-FT		2552.	3009.	3016.	3016.
THOUS CU M		3147.	3712.	3720.	3720.

MAXIMUM STORAGE = 24.

MAXIMUM STAGE IS 570.3

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIO 1 .10	RATIO 2 .25	RATIO 3 .50
				RATIOS APPLIED TO FLOWS		
HYDROGRAPH AT	A1	2.50	1	784.	1960.	3920.
		(6.47)		(22.20)(	55.50)(	110.99)(
			2	784.	1960.	3920.
				(22.20)(	55.50)(	110.99)(
ROUTED TO	A2	2.50	1	1192.	1945.	3910.
		(6.47)		(33.75)(	55.09)(	110.73)(
			2	775.	1955.	3910.
				(21.95)(	55.35)(	110.73)(
ROUTED TO	A3	2.50	1	1190.	1946.	3911.
		(6.47)		(33.70)(	55.11)(	110.75)(
			2	775.	1955.	3911.
				(21.95)(	55.35)(	110.75)(
ROUTED TO	A4	2.50	1	1189.	1946.	3911.
		(6.47)		(33.68)(	55.12)(	110.76)(
			2	775.	1954.	3911.
				(21.96)(	55.35)(	110.75)(
ROUTED TO	A5	2.50	1	1121.	1939.	3906.
		(6.47)		(31.76)(	54.90)(	110.62)(
			2	772.	1949.	3908.
				(21.87)(	55.20)(	110.66)(
HYDROGRAPH AT	A6	2.80	1	982.	2456.	4912.
		(7.25)		(27.82)(	69.55)(	139.09)(
			2	982.	2456.	4912.
				(27.82)(	69.55)(	139.09)(
2 COMBINED	A7	5.30	1	2094.	4212.	8610.
		(13.73)		(59.29)(	119.26)(	243.80)(
			2	1681.	4287.	8607.
				(47.60)(	121.39)(	243.71)(
ROUTED TO	A8	5.30	1	2504.	4171.	8572.
		(13.73)		(70.91)(	118.12)(	242.73)(
			2	1662.	4256.	8569.
				(47.06)(	120.52)(	242.66)(
ROUTED TO	A9	5.30	1	2418.	4170.	8571.
		(13.73)		(68.46)(	118.08)(	242.69)(
			2	1662.	4248.	8566.
				(47.06)(	120.30)(	242.56)(
ROUTED TO	A10	5.30	1	2417.	4171.	8570.
		(13.73)		(68.44)(	118.11)(	242.68)(

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			2	1662.	4248.	8575.
			(	47.07)(	120.29)(	242.54)(
ROUTED TO	A11	5.30	1	2407.	4170.	8572.
	(	13.73)	(	68.15)(	118.09)(	242.73)(
			2	1662.	4247.	8566.
			(	47.07)(	120.25)(	242.57)(
ROUTED TO	A12	5.30	1	2408.	4171.	8573.
	(	13.73)	(	68.19)(	118.10)(	242.75)(
			2	1662.	4246.	8565.
			(	47.07)(	120.22)(	242.54)(
ROUTED TO	A13	5.30	1	2440.	4167.	8564.
	(	13.73)	(	69.08)(	118.01)(	242.50)(
			2	1659.	4248.	8554.
			(	46.99)(	120.29)(	242.24)(

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	670.00	669.00	673.20
STORAGE	70.	60.	106.
OUTFLOW	10.	0.	239.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	673.35	.15	108.	1192.	.69	16.83	15.83
.25	673.60	.40	111.	1945.	2.46	17.33	14.17
.50	674.82	1.62	128.	3910.	5.79	17.33	13.50

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	670.00	669.00	673.20
STORAGE	70.	60.	106.
OUTFLOW	10.	0.	239.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	673.81	.61	114.	775.	4.33	17.33	0.00
.25	674.65	1.45	125.	1955.	7.00	17.33	0.00
.50	675.60	2.40	139.	3910.	8.50	17.33	0.00

PLAN 1 STATION A3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1190.	668.6	16.83
.25	1946.	669.8	17.33
.50	3911.	671.9	17.33

PLAN 2 STATION A3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	775.	667.7	17.33
.25	1955.	669.8	17.33
.50	3911.	671.9	17.33

PLAN 1 STATION A4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1189.	669.2	16.83
.25	1946.	670.1	17.33

.50	3911.	671.3	17.33

PLAN 2 STATION A4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	775.	668.1	17.33
.25	1954.	670.1	17.33
.50	3911.	671.3	17.33

PLAN 1 STATION A5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1121.	640.3	17.00
.25	1939.	641.3	17.50
.50	3906.	642.9	17.33

PLAN 2 STATION A5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	772.	639.7	17.50
.25	1949.	641.3	17.33
.50	3908.	642.9	17.33

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	634.90	634.90	637.10
STORAGE	155.	155.	197.
OUTFLOW	0.	0.	483.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	637.31	.21	201.	2504.	.77	16.67	15.67
.25	637.89	.79	213.	4171.	2.92	17.33	14.00
.50	639.88	2.78	255.	8572.	6.15	17.17	13.17

PLAN 2 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	634.90	634.90	637.10
STORAGE	155.	155.	197.
OUTFLOW	0.	0.	483.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	638.27	1.17	221.	1662.	4.67	17.33	0.00
.25	639.82	2.72	254.	4256.	7.50	17.17	0.00
.50	641.57	4.47	292.	8569.	9.00	17.17	0.00

PLAN 1 STATION A9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	2418.	616.9	16.67
.25	4170.	618.4	17.33
.50	8571.	620.6	17.17

PLAN 2 STATION A9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1662.	616.0	17.33
.25	4248.	618.4	17.17
.50	8566.	620.6	17.17

PLAN 1 STATION A10

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	2417.	615.5	16.67
.25	4171.	616.2	17.33

.50	8570.	617.5	17.17

PLAN 2 STATION A10

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1662.	615.1	17.33
.25	4248.	616.2	17.17
.50	8565.	617.5	17.17

PLAN 1 STATION A11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	2407.	611.3	16.83
.25	4170.	613.0	17.33
.50	8572.	615.4	17.17

PLAN 2 STATION A11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1662.	610.5	17.33
.25	4247.	613.0	17.17
.50	8566.	615.4	17.17

PLAN 1 STATION A12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	2408.	611.1	16.83
.25	4171.	612.5	17.33
.50	8573.	613.5	17.17

PLAN 2 STATION A12

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1662.	609.8	17.33
.25	4246.	612.6	17.17
.50	8565.	613.5	17.17

PLAN 1 STATION A13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	2400.	566.5	16.83
.25	4167.	567.9	17.33

.50	8564.	570.3	17.17

PLAN 2 STATION A13

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	1659.	565.6	17.33
.25	4248.	568.0	17.33
.50	8554.	570.3	17.17

APPENDIX 4

REFERENCES

LAKE AMES DAM

APPENDIX 4

REFERENCES

LAKE AMES DAM

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